Petroleum review

JUNE 2001

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- Setting sights on subsea development

Mexico

- Between safe play and confusion

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Petroleum review

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ABBREVIATIONS

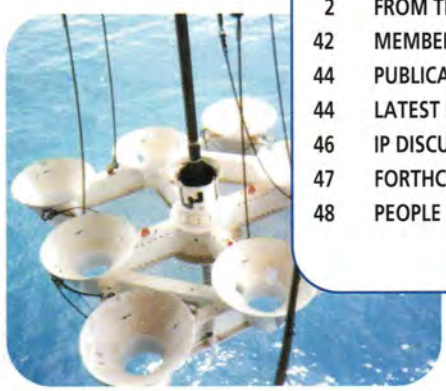
The following are used throughout *Petroleum Review*:

mn	= million (10^6)	kW	= kilowatts (10^3)
bn	= billion (10^9)	MW	= megawatts (10^6)
tn	= trillion (10^{12})	GW	= gigawatts (10^9)
cf	= cubic feet	kWh	= kilowatt hour
cm	= cubic metres	km	= kilometre
boe	= barrels of oil equivalent	sq km	= square kilometres
		b/d	= barrels/day
t/y	= tonnes/year	t/d	= tonnes/day

No single letter abbreviations are used. Abbreviations go together eg. 100mn cf/y = 100 million cubic feet per year.

Front cover: Photo provided courtesy of KCA Drilling, taken on the Britannia Platform operated by Britannnia Operator Ltd

inside...



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ROUNDUP From the Editor

Easing demand, a collapsing dot.com and an emerging crisis

The last few weeks have seen a number of developments with important implications for the international oil and gas industry. The International Energy Agency (IEA), following its sixth downward revision of oil demand this year, now predicts demand growth of just 1mn b/d (1.4%) over 2000 demand of 75.7mn b/d.

Opec, however, appears keen to ensure that slackening demand does not translate into weakening prices. The broker Salomon Smith Barney in its most recent report notes that Opec quota compliance reached 73% in April. The IEA monthly report shows that this was achieved by a 840,000 b/d cut by the Opec 10, partly offset by a 280,000 b/d gain by Iraq. As Iraq is once again approaching capacity, Opec's price ambitions seem likely to be fulfilled. Few oil company shareholders attribute their company's dividends to Opec – perhaps they should.

Recent stockbroker reports and the IEA monthly report now confirm a rapid rebuilding of crude and product stocks around the world. The one significant exception, and one that has attracted some publicity, is gasoline stocks. These remain low, but the next month or so will show whether there is a fundamental problem or whether these are just the last to rebuild as a result of this year's extended refinery shutdowns in the US which have now ended.

The month also saw the effective bankruptcy of Petrocosm, the procurement portal backed by Chevron and Texaco. Initial reaction was that TradeRanger, the other major procurement portal backed by Shell, BP and twelve other companies had scooped the pool. Greater reflection suggests that the whole rationale of procurement portals may have been called into question. The problem is deceptively simple and highly intractable – what's in it for the sellers?

The act of cataloguing any product tends to commoditise it, removing or diminishing its unique attributes. Some products such as drill pipe are effectively commodities and readily cataloguable, but most products have some or many unique features. Norman Chambers, Petrocosm's Managing Director, told *Petroleum Review* some months ago of the pressure from suppliers to add more columns of descriptions for their products. However, too many descriptions of features and all you have is an electronic version of the supplier's catalogue.

Another area of concern has been security. However many firewalls and protective features are installed, both suppliers and buyers remain terrified that their confidential terms and prices may be accessed by others. Over time, electronic transactions will undoubtedly become the normal way of doing business – the unanswered question is whether it will be through single company buysites (an electronic interface for the buying department) or via multi-company procurement portals. The tide may now move against the portals unless they can offer a lot more to the sellers.

A similar imbalance is to be seen in the notionally popular (to the buyers) reverse auctions. Unless the seller is very distressed and desperate for the business, reverse auctions just drive prices down to the pain point. Highly distressed or pained sellers are unlikely to be reliable suppliers as 'unequal' contracts rarely prove satisfactory. Solving the buyer–seller imbalance will ultimately be the key to making e-commerce work.

Undoubtedly the key event of the month has been the unveiling of President Bush's energy policy, developed by the Vice President Dick Cheney. Although 'the nation facing the greatest energy crisis since the 1970s' is hyperbole, the policy does challenge the US to face up to the fact it has been attempting to have its environmental cake and eat it in the form of low price energy.

Certainly, there is much that can be done to ease the situation in terms of easier permitting, more construction of pipelines and power lines and more drilling to exploit resources. It is rather harder to see how private power companies can invest in nuclear power without government financial guarantees.

The real challenge, however, is the sheer volume of oil imports into the US. The latest IEA statistics show US oil demand of fractionally under 20mn b/d and oil production of 5.9mn b/d. Some 1.85mn b/d of NGLs and 0.4mn b/d of other hydrocarbons brings the liquids total up to just over 8mn b/d. This leaves 12mn b/d of liquids to be imported. Currently this is met by just under 10mn b/d of crude imports and just over 2mn b/d of product imports.

Tabulated below are the world's largest oil importers and exporters in 2Q2000. This clearly shows that US import demand is 'the crisis' for both the US and the world. It is hard to believe that the US can continue to absorb the entire volume of the world's two largest crude exporters without coming into aggressive competition with other potential major importers such as China and India.

Chris Skrebowski

	Country	Net import volume (mn b/d)
1	USA	10.74
2	Japan	5.38
3	Germany	2.41
4	Korea	2.19
5	France	1.77
6	Italy	1.63
7	Spain	1.42
8	China	1.22
9	India	1.17
10	Netherlands	0.91

The world's 10 largest net oil importers in 2Q2000 *Source: IEA*

	Country	Net export volume (mn b/d)
1	Saudi Arabia	7.25
2	FSU	4.26
3	Norway	2.75
4	Venezuela	2.64
5	Iran	2.63
6	UAE	2.49
7	Iraq	2.14
8	Nigeria	1.85
9	Mexico	1.56
10	Kuwait	1.47

The world's 10 largest net oil exporters in 2Q2000 *Source: IEA*

A new site dedicated to the history of European oil company road maps was recently launched at **www.petrolmaps.co.uk** The site holds over 950 images of maps and atlases dating from 1905 to 2001, and includes examples from around 118 different brands. All the major European countries are represented and there is a brief downstream history for most of the companies listed.

Other site features include a list of main cartographers; articles on special topics, including dating maps; and focused articles on selected countries. There are also quizzes and an online jigsaw! The site is fully searchable and features a links page to related websites – including the Institute of Petroleum.

In Brief

UK

***TotalFinaElf is understood to be planning** to begin gas exports from its Elgin condensate field in the North Sea as* Petroleum Review *went to press. Production from the neighbouring Franklin field is due to begin in August 2001.*

***Marathon Oil is understood to have** been given the go-ahead by the UK Government to drill an appraisal well on its Dragon discovery offshore Wales in the Irish Sea in 2002. The area surrounding Dragon is reported to be in an environmentally sensitive area and to lie in a shipping lane.*

***TotalFinaElf has awarded Baker** Hughes Centrilift a $25mn contract for the provision of electrical submersible pumps (ESPs) to produce its Otter subsea field in the North Sea. The ESPs will be deployed from next year in three wells lying 22 km from the host platform – Shell's Eider facility.*

***Amerada Hess reports that an** appraisal well on the York area in block 47/3a of the southern North Sea has tested at 24.7mn cf/d of gas. Probable gas reserves are put at up to 200bn cf.*

***Talisman Energy's Lucy exploration** well in the central North Sea is reported to have found oil. Reserves are put at between 20mn and 50mn barrels of oil. Development is likely to be via an extended reach well from the nearby Piper Bravo platform.*

***BP's Claw prospect appraisal well in** the Atlantic Margin is reported to have discovered 20 metres of oil sands with significant hydrocarbon reserves. The well lies close to the company's Schiehallion field.*

Europe

***The Norwegian Petroleum Directorate** is reported to have downgraded recoverable reserves for the North Sea Njord and Visund fields. Njord reserves are now put at 138mn barrels, down 40mn barrels, and Visund's recoverable reserves are put at 233mn barrels, down from 305mn barrels.*

***Norsk Hydro is understood to have** awarded Aker Maritime a NKr500mn contract for engineering, construction and installation work on its Fram West field in the North Sea. A new produc-*

NEWS Upstream

Alaska sinks offshore Arctic pipeline route

In April, the Alaska State legislature passed a law that forbids building an offshore pipeline to connect natural gas reserves in Prudhoe Bay to reserves in Canada's Mackenzie Delta, writes *Gordon Cope.*

Currently, there are several proposals to move the estimated 41tn cf of known natural gas reserves in Alaska and the North West Territories to markets in the south. The two main projects under consideration are the Alaska Natural Gas Transportation system, a 3,000-km pipeline down the Alaska Highway to northern British Columbia, and the shorter Mackenzie Valley route, from the Mackenzie Delta to northern British Columbia.

A third consideration is to ship Prudhoe Bay gas via a 2,300-km line under the Beaufort Sea to Mackenzie Delta and then down the valley. Alaskan politicians see few construction and long-term operating benefits to the offshore route, however, and have passed the legislation to forestall that option.

Proponents of the Mackenzie Valley route say that the new law could strand Canadian gas for many years if an Alaska-only pipeline is built.

The Canadian Government, which would have final say on either route, has announced that it will remain politically neutral on the issue of pipeline routes.

A consortium of Prudhoe Bay producers, Phillips Petroleum, BP and Exxon, is currently conducting a $75mn feasibility study of both routes, and is expected to come to a conclusion on a preferred route by the end of the year. It says that it will base its decision on economics, and considers the Alaskan legislation premature.

Floating GTL services unlock resources

PGS Production, a division of Petroleum Geo-Services, and Syntroleum have signed a Letter of Intent to pursue a joint venture to develop, market and operate mobile marine production facilities based on Syntroleum's proprietary gas-to-liquids (GTL) technology. The proposed joint venture would offer multi-year contract GTL services to gas producers to convert otherwise stranded natural gas from multiple offshore fields into marketable hydrocarbon products ranging from synthetic crude to finished fuels such as diesel and jet.

Syntroleum believes that there is significant market potential for the mobile floating facilities. Not only could they be used at multiple locations, providing access to fields that would otherwise be too small to justify permanent GTL facilities, they could also enable conversion of gas that is normally flared or wasted. In addition, they could be used on a short-term basis as an early production system on large fields while a large, permanent GTL plant is being built, as well as a long-term solution for offshore gas in a range of water depths.

Exploration hat-trick

Sibneft has secured licences to exploit three onshore areas in the far eastern Chukotka region. The company is planning the development of the Lagunny Depression as well as the Telekayskoye and the West Oztornoye blocks, marking an expansion of its upstream operations beyond its base in western Siberia. The blocks are located in the Anadyr Basin, on the Bering Sea.

Sibneft plans to begin drilling this summer in the Lagunny Depression that holds estimated reserves of 275mn barrels of oil. Telekayskoye holds a possible 20mn barrels and 2bn cm of gas, while the West Oztornoye block has estimated recoverable reserves of 5bn cm.

Trinidadian gas find

BP Trinidad and Tobago (BPTT) has announced the discovery of 1tn cf of gas offshore the east coast of Trinidad, located 2.5 miles east of the Flamboyant field. The total gas and condensate discovered by the Cashima 1 well – the first of four exploration wells planned in 2001 – is in excess of 180mn boe.

The company is confident that 100tn cf of gas will eventually be discovered off Trinidad's east coast. Just 1tn cf is reported to be enough to provide all of Trinidad and Tobago's electricity needs for 50 years at current usage. To date, a total of 35tn cf of gas has been discovered in Trinidad and Tobago – 23tn cf proven and 12tn cf probable and possible reserves.

NEWS Upstream

Joint study to tackle deepwater pipe corrosion

A new joint industry programme has been launched by corrosion specialist InterCorr International and Shell Global Solutions that will investigate cost-effective and reliable systems for monitoring corrosion and flow assurance in subsea pipelines. Other oil companies involved in developing the programme include BP, Intevep-PdVSA (the R&D arm of Venezuela's national oil company) and Brazil's Petrobras.

Eventually, a total of between 10 and 15 oil and gas producers, major suppliers and service companies are expected to become involved in the initiative. According to Dr Andrea Etheridge, Senior Consultant for InterCorr: 'Those who sign early – within 90 days after the programme starts – will save about 25% of the cost to participate. Our experience has show that most companies recoup their participation cost in this type of programme with only a single application of the technology.'

Offshore oil flows out of the ground at high temperature, but is then rapidly cooled by deep water at low temperatures once in the subsea pipeline. This can cause precipitation of water that increases corrosivity and can also cause deposition of waxy substances, both of which can jeopardise flow, system integrity and ongoing operations. The study aims to provide a common solution to both these problems.

Another problem currently experienced by deepwater operators is that only limited monitoring options are available in today's market, and none has been proven in deepwater service. The joint industry programme will aim to integrate several monitoring capabilities into a single unit and to verify their performance under simulated deepwater conditions in advance of a field trial. The system developed will be adaptable to subsea, pipe-in-pipe, insulated or buried flowlines.

ABS contract for Petrobras projects

ABS has been selected as the preferred classification society for Petrobras' Barracuda and Caratinga projects offshore Brazil.

Working on behalf of the main contractor – Kellogg Brown & Root – ABS will class the projects' two FPSOs that will be operating in water depths ranging between 670 metres and 1,200 metres.

The vessels are to be converted from two ABS-classed Stena/Universe VLCCs (very large crude carriers).

They will be capable of storing approximately 2mn barrels of oil and processing 150,000 b/d.

Pictured left is the *Caratinga* FPSO getting ready to set sail from the Angra shipyard.

First production from Krapivinskoye

Sibneft's Krapivinskoye field in the Omsk region of Russia has come onstream. Output from the field under the first phase of development, in which 14 wells are to be drilled, is set to climb rapidly to a peak of 7,000 b/d in 2003. The company is also exploring nearby acreage which is expected to boost production to at least 20,000 b/d.

Total recoverable reserves are currently put at 62mn barrels, although this is expected to rise significantly following the completion of additional exploration work.

In Brief

tion module is to be constructed for the nearby Troll C platform, which will be tied in to Fram West. Production is slated to begin in October 2003 and is forecast to plateau at over 60,000 b/d. Total recoverable reserves are put at 106mn barrels of oil and 8bn cm of gas.

***Norsk Hydro is understood to have discovered** oil north of the Tordis field in the North Sea. It is likely to be developed using Snorre and Gullfaks infrastructure already in place.*

North America

***Enterprise Oil has assumed operatorship** of the Llano field in Garden Banks blocks 385 and 386 in the Gulf of Mexico from EEX. It is planned to drill an appraisal well on the unappraised block 385 later this year.*

***Petro-Canada has reportedly won a** $2.5mn bid for 323,000 acres of land on the North Slope of Alaska in a recent lease sale.*

***A total of 14 blocks are to be offered** in the 2001 Newfoundland-Labrador licensing round.*

***Shell's Glider prospect in the Gulf of** Mexico is reported to be likely to be sanctioned this year as a subsea satellite tieback to the Brutus field.*

***Santa Fe International has issued a** Letter of Intent to PPL Shipyard of Singapore for the construction of two Freide & Goldman ExD design deepwater semisubmersible drilling rigs, at a cost of $285mn each, plus options for two additional rigs.*

Middle East

***The Yam Thetis consortium is reported** to have approved $235mn investment over three years to develop the Mary gas field offshore Iran. The field is due onstream in 2003.*

***Oman is reported to have made a 'significant' gas discovery** with its Khazan 1 field, in central Oman, located west of the Saih Rawl field.*

***Saudi Arabia is reportedly keen on** adding a further 1.5mn b/d to its oil production capability over the next few years. The Qatif project, costing an estimated $1bn, involves working over two mothballed fields that could yield 500,000 b/d. A new development, the Khurais project, is also*

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expected to pump 1mn b/d. Foster Wheeler Energy Ltd (FWEL) has secured the contract from Aramco Overseas Company to develop the incremental crude oil and associated gas resources from the two fields.

***CSO Aker Engineering is reported to** have secured a contract for the engineering, procurement, installation and commissioning of a subsea field development on Samedan's Noa and Mari-B gas fields offshore Israel. The Noble Affiliates subsidiary is contracted to supply gas to the Israeli Electric Corporation for power generation from 2003.*

Russia & Central Asia

***David Woodward, CEO of AIOC and BP** Azerbaijan, has announced that peak output from Azeri-Chirag-Guneshli and Shakh-Deniz fields will reach 1mn boe/d by 2008.*

***Russian oil production continues to** increase, according to UFG. From January to April this year it was up 6.1% compared with the equivalent period last year.*

***TotalFinaElf (14.28%) and partners in** the OKIOC Consortium have recently announced the successful testing of the Kashagan West 1 well located on the Kashagan structure in the Kazakhstan sector of the Caspian Sea. The well flowed at 3,400 b/d of oil and 7.6mn cf/d of gas.*

***BP has awarded Abbot Group subsidiary** KCA Drilling the £1.5mn contract for the front-end engineering design of the drilling and production platform for the Shakh Deniz gas field in the Caspian Sea.*

***ABB has signed a contract with Exxon** Neftegas, operator of the Sakhalin 1 consortium, for the front-end design on the first phase of the project in eastern Russia.*

***GVA Consultants of Sweden and the** National Iranian Oil Company (NIOC) are to build an oil rig on a submersible platform in the northern Iranian province of Mazandaran, writes* Stella Zenkovich. *The rig, being built under a $226mn contract, is destined for use in the Caspian.*

***Tengizchevroil has announced an** increase in its total proven, probable and possible oil reserves from 8.8bn to 19bn barrels.*

Falling UK oil production

Monthly oil production from the UKCS in February 2001 fell to its lowest level since June 1997, according to the latest Oil and Gas Index from The Royal Bank of Scotland. Oil output in January and February this year averaged 2.2mn b/d, 14% below the level of a year earlier. While it is likely oil production will recover later in the year, the Bank suggests that average daily output is unlikely to exceed 2.4mn b/d – last year's monthly average.

The value of oil production in February increased to £2.1mn/d. This represented a rise on the month of 5.3%. Average daily production in the 12 months to February was 10% lower than the year to February 2000.

Gas production also declined in February, but by considerably less than oil. Output was down by 2.8% compared with February last year. Average daily output in the 12 months to February was 7.3% higher than in the 12 months to February 2000. Estimated gas revenues fell by £0.92mn/d, or 5.1% on the month, and were down by 8.5% compared with February last year.

Combined average daily production in the 12 months to February 2001 was 3.2% lower than in the previous 12-month period. Combined revenues are provisionally estimated to have risen by £1.18mn/d (2.1%) on the month, and stand at £58.8mn/d.

Stephen Boyle, Oil and Gas Economist at the Bank said: 'Prices have risen sharply in the last month, mainly because of Opec's cut in production and refinery constraints in the US. The recent incident at the Killingholme refinery adds only marginally to the upward pressure on crude prices.'

Date	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price ($/b)
Feb 2000	2,567,535	12,743	27.97
Mar	2,606,250	12,485	27.27
Apr	2,480,945	12,149	23.15
May	2,222,686	9,089	24.15
Jun	2,436,450	8,609	30.50
Jul	2,383,944	7,531	28.90
Aug	2,339,363	7,464	31.60
Sep	2,281,516	8,080	33.70
Oct	2,247,307	10,172	30.90
Nov	2,322,296	11,621	32.80
Dec	2,399,038	11,439	26.30
Jan 2001	2,274,671	13,061	25.80
Feb	2,210,444	12,389	27.50

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

Focus on facilities engineering technology

The Facilities Engineering Association (FEA) is a recently launched European operator network with a worldwide focus on upstream oil and gas facilities technology. The objective of the FEA is to promote knowledge sharing and lessons learnt regarding different technological approaches, applications and experiences amongst members and also to stimulate the development of new technologies within the facilities area. The FEA will primarily focus on transportation, subsea flow control, support structures, processing and environmental management.

The Association, which currently comprises Amerada Hess, BG, Enterprise Oil, Phillips Petroleum, Ranger Oil, Statoil, Talisman Energy and Veba Oil & Gas, will meet three times a year to share case history experience, look at the future of the industry and discuss ways to focus and encourage the research and development work of suppliers.

Its first meeting included a workshop on integrity management and members identified technological gaps in cost-effective jacket repairs, multiphase metering and hydrate inhibition for long gas tie-backs. The next meeting takes place on 21–22 June 2001 in Aberdeen and includes a technical workshop entitled 'Processing Heavy and Viscous Crudes, including Wax Management'.

The FEA invites universities, contractors, SMEs and other research institutes to bring facilities engineering project proposals to their attention. For further information and joining details visit **www.fea-forum.com**

Brazilian rig disaster probe

The Commission of Inquiry has published its initial findings into the sinking of the Petrobras P-36 platform in around 1,360 metres of water in northern part of the Campos Basin, Brazil, on 20 March 2001. A total of 11 firefighters lost their lives in the tragedy.

The platform had 1.5mn litres of oil onboard. Oil pollution was carefully monitored, but does not appear to have threatened the coast. Although a 42,000 litre oil slick was spotted 25 km north of where the rig sank, it was reported as being in an advanced stage of dispersion.

P-36 was insured for $500mn and the accident has been a major factor leading to an increase in the company's overall insurance premium from $7.3mn/y to $39.1mn/y.

The Commission reports that an explosion occurred on the fourth level of the starboard after column. This column extended from the pontoon up to the deck and contained a ventilated stairwell, pipes and cables. It also incorporated tanks in its external double skin. Seven possible hypotheses are being studied for the cause of the explosion – two of which relate to the flow of hydrocarbons from process systems into the tanks built into the column in question.

An initial recommendation has been made relating to tanks and receptacles built into columns or pontoons. The Committee suggests that steps should be taken to ensure that such tanks should not be connected to processing systems on future projects and that the connection of these tanks to process systems, on existing installations, should be evaluated.

It is thought that the 11 firefighters probably lost their lives in a second explosion – the exact location of which has yet to be identified.

The favoured hypothesis for the subsequent flooding and sinking of the platform is that a seawater cooling pipe failed as a result of the explosions, allowing water to enter the starboard column. The seawater inlet valve could not be closed. The rig was listing at an angle of 16° when it was abandoned. At this point, sea openings to the chain lockers became submerged, permitting progressive flooding and eventual sinking.

There was a great deal of speculation in the immediate aftermath of the disaster, that a temporary solution implemented to overcome problems with the tank vent system might have been the cause of the original explosion. The report described this hypothesis as 'unlikely.'

Irish drilling programme

The Norwegian drill ship *West Navion* is currently drilling a £20mn well in 1,620 metres of water offshore Ireland for Enterprise Energy Ireland (50%) and partners Mobil Oil North Sea (25%) and Murphy Ireland Offshore (25%).

The vessel arrived at the Errigal prospect in the Rockall Basin, block 6/97, on 23 March and drilling was expected to be completed in 50 days. Results of the well analysis are not expected until early 2002.

In Brief

Asia-Pacific

***The Chinese authorities are understood** to have given PetroChina the green light to open to foreign investors six gas-rich areas in the northwest Tarim Basin. The six blocks opened for development lie along the route of a planned 4,200 km pipeline that will carry gas to eastern provinces.*

***PetroChina's Keshen 101 well drilled** in the Tarim Basin in northwest China is reported to have tested at 133,000 cm/d of gas and 96.7cm/d of oil.*

***Lundin Oil of Sweden is understood to** have made a 'significant' oil discovery with its East Bunga Raya No 1 well on block PM-3 CAA offshore Malaysia/Vietnam which tested at 5,500 b/d.*

***The Pakistani Government is understood** to be seeking funding of at least $1bn from foreign companies to develop seven gas fields that have been discovered over the past year and a half. Combined reserves are put at 1bn cf – enough to meet some 40% of the country's domestic gas needs.*

Latin America

***Brazil is to put out to tender 53 blocks** in its third licensing round. A total of 31 of the blocks lie in deep water.*

Africa

***Repsol YPF and partners OMV,** TotalFinaElf and Saga Petroleum Mabruk report that Well A-2, the third well to be drilled in block NC-186 in Libya's Murzuk Basin, has tested at up to 2,670 barrels of oil from the Hawaz sandstone formation.*

***OMV has signed an exploration and** production agreement for block 5B in the highly prospective Muglad Basin in southern Sudan. More than 200,000 b/d of oil are currently being produced in neighbouring blocks 1 and 2. A significant oil discovery – Thar Jath – was also recently made in block 5A.*

***A joint venture of Egypt's Gulf of Suez** Oil Company (Gupco) and BP has made two new oil finds in the Gulf of Suez, reports* Stella Zenkovich. *The first tested at 10,000 b/d of oil and has proven reserves of 29mn barrels. The second tested at 3,000 b/d of oil, with reserves of 6.5mn barrels.*

In Brief

UK

The UK Government has established a *Climate Change Projects Office in a bid to help UK companies cut their greenhouse gas emissions. It will headed by Powergen Chief Executive Officer Nick Baldwin.*

BP has posted a record 1Q2001 pre-tax *profit of £2.86bn ($4.12bn), some 52% higher than that recorded for the same period a year earlier. However, the company's UK-based fuel retail business is understood to have made a £14.6mn loss in the first quarter. Return on average capital employed (ROACE) was 25%, compared with 21% a year ago.*

Shell has posted a 1Q2001 net income *of $3.9mn, up 23% on that recorded for the same period a year earlier, with its return on average capital employed (ROACE) topping 20%.*

US-based InterContinentalExchange *(ICE) has agreed the takeover of London's International Petroleum Exchange (IPE). IPE shareholders will receive shares in ICE worth $67.5mn, redeemable for cash once IPE has completed the move to electronic trading. The shareholders will also receive ordinary shares accounting for a 5% stake in ICE (worth $75mn).*

BP has officially changed the name of *its parent company from BP Amoco to BP. Shareholders voted by 98.25% to change the name at an AGM on 19 April 2001.*

Aminex, a UK independent oil and gas *company, has released its 2000 end of year figures. The company achieved turnover in 2000 of $19mn, an increase of over $3mn from 1999.*

Europe

Repsol YPF has posted a 1Q2001 net *income of euro595mn, up 20% on that recorded in the same period a year ago.*

TotalFinaElf has posted a 2000 net *income of euro7,637mn, an increase of 128% on the 1999 figure.*

Eni's first quarter earnings have *reportedly risen 5.7% to $3.3bn compared with last year's figures.*

All TotalFinaElf service stations in the *UK, Germany and the Netherlands are*

Southeast Asian gas supply and demand

The gas markets of the southeast Asian region are emerging from a period of stagnation and the competitive landscape has changed, according to a recent report from Edinburgh-based consultant Wood Mackenzie. The Thailand–Java corridor, encompassing the gas markets of Thailand, Malaysia, Singapore, Sumatra and Java and the gas supply of Myanmar, Thailand, Vietnam, Malaysia and Indonesia, are reported to be developing as a 'distinct and self-contained region within southeast Asia for the supply and distribution of gas.' In addition, security of supply concerns are stimulating cross-border gas trade in the corridor and an extensive transmission network is evolving.

'However, the evolution of the supply–demand picture in this area is far from clear,' states Wood Mackenzie. Its study into the scope and location of future gas demand, the competitive position of the region's main supply hubs and the likely evolution of gas trade and its impact on regional supply dynamics, highlights that:

- There will be significant growth in gas demand in the region over the next 15 years. At least 15tn cf of gas is needed (in addition to existing contracts) to satisfy demand in the Thailand–Java corridor to 2015.
- By 2015 there will be a need for a further 6bn cf/d of gas supply above existing contracts. This is more than the total current demand in the region.
- Although there is an overhang of gas supply in some markets, the primary gas buyers are repositioning themselves for a return to growth. Issues of security of supply, price and supply flexibility remain key, and attention is focused on both domestic and cross-border resources.
- There has been a general shift in contracting away from Thailand towards Malaysia and Singapore, reflecting the general post-economic crisis recovery process and the differing focus of the primary buyers of gas.
- It is predicted that Thailand will interact little with the remainder of the Thailand–Java corridor during the next 15 years, but there will be significant interaction between the other regions. Gas supplies from the West Natuna Sea and Sumatra will become of key strategic importance to the markets of Malaysia and Singapore. For Java, local reserve potential seems limited, and thus a call on gas from Sumatra and/or LNG may be required.
- The state oil companies are likely to continue to dominate the gas businesses in the Thailand–Java corridor in the short to medium term. The effects of energy market liberalisation are unlikely to be felt until after 2015 and, as a result, it is likely that long-term contracts will continue to dominate gas transactions in all markets.
- Supply flexibility will be key to managing the vagaries of future market demand.
- The realisation of the ASEAN gas grid seems increasingly likely to emerge from a bottom-up integration of individual projects currently, or soon to be, underway across the region – rather than from any top-down unified efforts by the region's political leaders.
- While the ASEAN gas grid is not developing as originally envisaged, analysis suggests that by 2015 a largely interconnected gas pipeline network from Myanmar to Java could become a reality.

For further information, contact Gavin Law at Wood Mackenzie on Tel: +44 (0)131 243 4214; Fax: +44 (0)131 243 4472; e: **gavin.law@woodmac.com**

Shell bid for Woodside blocked

The Australian Government has blocked Shell's takeover bid for Woodside Petroleum, stating that the merger was 'contrary to the national interest.'

Commenting on the decision, Federal Treasurer Peter Costello stated that he had 'taken into account that Woodside is a joint venturer with Shell in the North West Shelf (NWS) project, Australia's largest developed energy resource. Woodside is the operator of the project and it is in the national interest of Australia that the project be developed to its full capacity and that Australia's export sales from the NWS are maximised... While there have been positive discussions with Shell on steps to secure the independence of the operator and marketing functions, I have not been able to see that enduring conditions which are fully enforceable could be put in place in advance, as such conditions would require action after the approval and require the consent of joint venturers which cannot be guaranteed.'

EC and EU news update

There have been a number of announcements from the European Commission and European Union in recent weeks. *Keith Nuthall* reports.

- The European Commission has closed a competition inquiry into west Ireland's Corrib gas field following the decision of its owners – Enterprise Energy Ireland Ltd, Statoil and Marathon – to withdraw a bid to jointly market Corrib gas. The Commission 'welcomed' the decision to market gas individually, claiming it would 'give gas consumers in Ireland a wider choice.'
- The Member States of the European Union reduced their emissions of the six key greenhouse gases by 4% between 1990 and 1999, according to a report from the European Environment Agency. This takes the EU half-way towards achieving its Kyoto target of reducing emissions of these gases to 8% below their 1990 level by the years 2008–2012. The switch to gas-fired power stations in Germany and Britain was responsible for much of the cut, states the report.

  The EU is responsible for 24% of industrialised countries' man-made emissions of the six gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride.
- Member States of the EU are facing a continued determination by the European Commission to stop them compensating businesses for price rises in fuel, with the launch of state aid inquiries into rebates on diesel fuel duty granted to hauliers last summer by the Dutch, French and Italian Governments. EU Ministers have since voted to allow these Member States to continue these rebates, but that will not affect the Commission inquiry which will focus on whether the original rebates broke EU state aid rules. If it concludes that they did, then Brussels may order their repayment.
- The Commission has also recently announced that it will stage a similar investigation into VAT and income tax breaks granted to Spanish farmers by their national government following the price rise crisis. Meanwhile, the failure of Greece, Italy and Spain to pass national laws reducing sulfur content in a range of fuels, as required by EU Directive 1999/32/EC, has led to their governments being formally threatened with legal action at the European Court of Justice by the European Commission.
- The EC is also threatening legal action against Austria, Ireland, France, Sweden, Denmark, Belgium, the UK, the Netherlands and Finland for failing to ensure that waste oils are recycled, as laid down in the Waste Oil Directive.

New process and power industry consultancy

Cadcentre, the engineering IT company, has just launched Aveva Consulting, a new business consulting company for the process and power industries. Cadcentre discovered that many organisations in the process and power industries have failed to fully exploit the latest integration technology. Although these companies design, develop and maintain industrial plants and have invested in enterprise resource planning (ERP) systems for the integration of back-office functions such as human resources, finance and administration, they have not gained the anticipated benefits.

According to Cadcentre, many have IT systems that exist in isolation from each other with no links between the systems and information held on them. Consequently, there is no clear path to manage information, improve processes and lower costs across the organisation. 'Only now are directors realising that this problem can be solved,' it says.

Aveva Consulting is to offer a full range of services to design, build, implement, administer, operate and support business solutions across the engineering disciplines of process and power companies. Specifically, Aveva's services cover integration of the supply chain, exploiting knowledge across the enterprise and provision of integrated IT support for capital projects.

In Brief

to take on the Total name. Over 13,000 sites are understood to be involved, accounting for some 12% of the European fuel retail market.

***BP has completed the purchase of** Bayer's 50% shareholding in the two companies' German petrochemical joint venture Erdoelchemie for an undisclosed sum.*

***Norsk Hydro has posted a 1Q2001 net** income of NKr3,235mn ($363.5mn) compared with a figure of NKR2,451mn ($2.75.4mn) in 1Q2000.*

***Kvaerner has posted a 1Q2001 pre-tax** profit of NKr151mn, operating profit of NKr261mn and NKr10.5bn turnover.*

North America

***Kerr-McGee has bought HS Resources,** a small US gas company with assets in northeast Colorado. The deal is expected to be completed in 3Q2001 and will reportedly add 15% to Kerr-McGee's total daily production. The acquisition is valued at $1.3bn with the addition of $450mn in debt.*

***Valero Energy is understood to be** planning to acquire Ultramar Diamond Shamrock for $4.03bn in cash and stock and the assumption of $2.1bn of debt, to create what is claimed to be the largest independent refining company in the US.*

***Williams Cos is reported to have out-**bidded rival Shell with a $2.3bn cash and stock offer for Barrett Resources. Shell's $2bn offer had already been rejected by Barrett's board.*

***Talisman Energy has agreed to buy** Petromet Resources, a mid-sized natural gas producer based in Alberta for C$731mn, reports* Monica Dobie. *The acquisition adds about 110mn cf of natural gas production as well as 2,000 b/d of crude oil to Talisman's portfolio.*

US first quarter results

Company	1Q2001	Change
Phillips	$490mn	double
Halliburton	$86mn	+$59mn
Apache	$277.3mn	$173.1mn
ExxonMobil	$5.5bn	+$2.2bn
Conoco	$616mn	+$225mn
Chevron	$1.6bn	+53%
Schlumberger	$261mn	+92%

In Brief

UK

***Wincanton, the Somerset-based supply** chain management company, has been presented with a safety award by one of its clients, Air Products. Over the past year Wincanton has achieved a 60% reduction in recordable injuries with respect to Air Products' bulk distribution business.*

Europe

***DONG is reportedly planning to build** a $400mn gas pipeline linking Denmark to the UK. The pipeline is expected to be completed post-2003. DONG is keen to compensate for a possible future decline in its market share in Denmark and Sweden following the rapid progress in European gas liberalisation.*

***Delphi Automotive Systems recently** reached agreement with TotalFinaElf to collaborate on the research and testing of fuel cell technologies and fuel reformation.*

***TotalFinaElf is understood to have concluded** its acquisition of 42 Agip- and IP-branded service stations located on Italy's motorways, following Agip taking over a number of TotalFinaElf sites on French motorways.*

***The European Commission is understood to be planning to take France to** court for allegedly failing to liberalise its gas market as required under European Union law. The law called for member countries to open their markets by 20% by summer 2000.*

***Eléctricité de France (EDF) (50%),** TotalFinaElf (25%) and Texaco (25%) have signed an agreement to proceed with the development of a cogeneration unit, producing electricity and steam, at TotalFinaElf's refinery at Gonfreville l'Orcher, France, at a cost of euros 230mn (FFr1.5bn). The unit, expected to be commissioned in 2H2003, will supply the refinery and the neighbouring petrochemical complex operated by AtoFina, a subsidiary of TotalFinaElf.*

***Oiltanking Sonmarin – a 80:20 joint** venture between Oiltanking of Germany and Greeni of Finland – is expanding its presence in the Baltic region with the acquisition of Neftefinn's 40,500 cm capacity tank terminal in Kotka, Finland for an undisclosed sum.*

NEWS Downstream

Record numbers of clean fuel vehicles

The number of clean fuel vehicles (CFVs) in the UK hit record levels in 2000 and are set to peak again, with a further 100,000 expected to appear on UK roads over the next two years, according to the first *Clean Fuel Vehicles Market Report* published by TransportAction PowerShift.

The report indicates that earlier forecasts and targets for numbers of new CFVs – those running on alternative cleaner fuels such as LPG, natural gas and electricity – on UK roads were 'well beaten.' The total increase in CFVs predicted for 2000 was 15,000; the actual number at the end of 2000 was over 21,000.

Based on a survey of vehicle manufacturers, importers and converters, the report states that:

- This year should see a further 40,000 LPG vehicles on the UK's roads – twice the number that appeared in 2000.
- The slow increase in numbers of electric vehicles should be invigorated by the influx of electric hybrids such as the Toyota Prius and Honda Insight. It is expected that over 2,000 of these vehicles will be sold this year, in comparison with 360 in 2000.
- Natural gas usage should also see a steady increase this year, followed by a boom in 2002 now that concerns over fuel supply company changes abate and refuelling point investment activity increases.

The complete report can be found at **www.transportaction.org.uk**

UK fuel prices

During March 2001, according to figures from the *Allstar Fuel Report*, the average price for unleaded petrol in the UK was 75.21 p/l; the average price for super unleaded was 79.75 p/l and the average price of diesel was 78.16 p/l.

According to the report, one factor that is helping UK forecourt petrol prices remain high is the growth in US fuel demand. UK DTI statistics show that just over 88mn tonnes of oil were refined in the UK last year and of this, some 32mn tonnes (36%) was exported to the US. There has been a 17% growth in US oil imports since 1996 and the trend is likely to continue. The US imported over 12mn tonnes of oil in January 2001, an increase of 24% from the same period last year.

The recent fire incident at Conoco's Killingholme refinery means that other UK refineries will experience greater demand – half of Conoco's UK refining capacity of 230,000 b/d was destined for the US market. Strong US demand is expected to ensure continuing firm crude oil prices, which, combined with high fuel duties are the main factors that impact UK petrol prices.

LNG expansion plans

Woodside Energy has signed, on behalf of the North West Shelf Venture partners, a A$280mn contract with a Kellogg joint venture for the engineering, procurement and construction management associated with the expansion of the venture's LNG operations on the Burrup Peninsula, Australia. The Kellogg joint venture comprises Halliburton, Hatch-Kaiser Engineers, Clough Engineering and JGC Corporation.

The expansion project will see the construction of an additional LNG processing train with a capacity of 4.2mn t/y of LNG. A 42-inch diameter pipeline connecting the plant and the venture's gas fields is also to be constructed. First LNG production from the new train is slated for mid-2004.

New moves for KPGB

Kuwait Petroleum GB (KPGB) has acquired BP's direct fuels operation in central and southern England, doubling its market share in this area and increasing the company's overall business in the UK by 25%. The move sees KPGB continuing the expansion of Fuelcare – its fully owned distributor network, acquiring four BP fuel distributor depots at Cambridge, Banbury, Evesham and Braintree, as well as the oil company's Heating Services division. Together, the businesses service over 40,000 household, agricultural and commercial customers and 45 retail service stations.

The takeover of the Heating Services business of BP marks a new departure for KPGB, allowing it to service and maintain customers' heating appliances in addition to providing heating oil.

Wincanton seeks to regain No 1 slot

Wincanton, the UK's second largest logistics company, recently (18 May) gained a separate stock market listing from Uniq, its parent company. According to Peter Brown, Wincanton Managing Director, a separate listing will allow the company to 'move quicker' in terms of innovation and adapting to client requirements.

He told *Petroleum Review* that while Uniq had been a 'decent banker' being part of a food company meant that it could not be wholly focused on Wincanton business. His view was that speed of decision making was what the haulage client wanted, but in his own experience 'the bigger the company the slower the decision-making process.' The demerger would also allow Wincanton to extend its geographical spread to Continental Europe.

According to Brown, Wincanton was No 1 in the UK in terms of petroleum distribution three years ago, but was now only one of the top three along with P&O TransEuropean and Tankfreight (Exel). His aim is to restore Wincanton to the No 1 slot by being flexible and innovative – attributes which he believes will be enhanced by a separate stock market listing. The separate listing will also allow management to be more aggressive in terms of risk taking to grow the business.

Wincanton already delivers petroleum products for Texaco, TotalFinaElf and Tesco and recently gained the contract for all BP Castrol lubricants deliveries.

Brown believes that one of Wincanton's greatest strengths is in IT, which is the real key to the successful operation of a logistics business. He does however concede that although the haulage companies are keen to become more involved in distribution logistics, because this is the area where the greatest economics are availale, most oil companies are still ambivalent as to how much of the logistics planning they wish to give to third parties.

He remains surprised that some oil companies are still operating their own road tanker fleets, noting that: 'I can't see it lasting for ever.' He also noted that the most costly aspect for any fleet operator is restrictive practices on hours or access times, saying that he would rather pay drivers a higher salary and have fully operational flexibility rather than have to deal with the sort of restrictive practices once common in oil company fleet operations.

The oil companies were increasingly looking for smaller but more frequent deliveries, but had so far been reluctant to accept multi-terminal access which would allow vehicles to lift from the nearest and improve the logistics. Brown felt that there would be a further consolidation of oil terminals, but was less sure whether oil companies would allow logistics companies to operate terminals. He did think that, in time, the logistics companies would 'slowly move back up the supply chain' in the quest for lower supply costs.

Guandong LNG project

After two rounds of bidding, the Sino-foreign sponsors of the Guandong LNG Terminal & Trunkline Project have signed a Joint Ventures Heads of Agreement. China National Offshore Oil Corporation (33%), Guandong sponsors (31% – including Shenzhen Investment Holdings, Dongguan Fuel Industrial General and Guangzhou Gas Company), Hong Kong Electric (3%), the Hong Kong & China Gas Company (3%) and BP (30%) will establish a Joint Executive Office (JEO) principle to conduct a feasibility study for the project.

The JEO will competitively select LNG supply and shipping arrangements and finalise Heads of Agreement for LNG supply, shipping and gas sales contracts. The project is expected to be commissioned in 2005.

LNG sale agreed

The North West Shelf LNG Sellers have agreed and signed key terms for the sale of up to 3.7mn tonnes of LNG over five years to Shell Gas & Power. The agreement covers LNG supply between 2004 and 2009. The actual volume is dependent on the volume of LNG that the North West Shelf LNG Sellers will commit to long-term customers in the core markets of Japan, Korea, China and Taiwan.

The LNG will be supplied from the build-up period of the North West Shelf's fourth LNG train at its production facilities on the Burrup Peninsula, Western Australia. Construction of the fourth LNG train, at a cost of A$1.6bn is intended to start in September 2001. First production is slated for mid-2004.

In Brief

North America

***Conoco has announced that it plans to** build a $75mn gas-to-liquids demonstration plant based at Ponca City in Oklahoma. Slated to come onstream in late 2002, the pilot plant will convert natural gas into 400 b/d of sulfur-free diesel, jet fuel and other products. The company plans to begin building its first commercial GTL plant by 2004.*

***Tulsa-based Williams Express is understood** to be selling its 198-strong network of Mapco Express branded service stations and convenience stores to Delek of Israel for $147mn.*

Middle East

***Qatar is to sign a deal to export 1.5mn** tonnes of LNG to Spain, reports* Stella Zenkovich.

***Snam, the engineering subsidiary of** Italian energy group Eni, has been commissioned to build a 200,000 b/d gas condensate fractionation plant in Saudi Arabia, located next to the Gulf Ras Tanura refinery.*

***Kuwait National Petroleum Company** is to sell Chinese state oil trader Chinaoil 4mn barrels of crude between May and the end of the year in distinct lots of approximately 1mn barrels every two to three months to feed PetroChina's Dalian-based WEPEC refinery.*

***A total of 20 bidders have been pre-**qualified for an engineering, procurement and construction (EPC) contract to upgrade and revamp the effluent water treatment facilities at the Mina al-Ahmadi, Mina Abdullathi and Shuaiba refineries in Kuwait at a cost of $51.5mn.*

***The Israeli National Infrastructure &** Finance Ministries have called an international tender for the construction of a nationwide gas distribution grid projected to cost $400mn by 2003. Five foreign/local bidding groups were prequalified for the 30-year BOT concession, also involving the construction of two overland and subsea pipelines, reports* Stella Zenkovich.

***The Middle East Oil Refinery (Midor)** Israeli–Egyptian joint venture has reportedly been awarded its first gasoline and jet fuel export tender. The 100,000 b/d refinery, that started full*

production in early April 2001, has sold 180,000 tonnes of petrol and 150,000 tonnes of jet fuel. Dutch company Vitol was awarded all the gasoline cargoes and two of the jet fuel cargoes, with BP winning the remaining three 30,000 tonne cargoes of 98-RON unleaded for June 2001, all on a free on board (FOB) basis from Alexandria.

Russia and Central Asia

The Lithuanian Government has officially announced that it is prepared to sell a 33% stake in Mazheikiu Nafta to Lukoil, although it cannot provide the Russian oil company with operating control over the refinery and export terminal due to the agreement with US company Williams, reports UFG. 'Despite this offer exceeding Lukoil's previous demands of a 10%-30% stake, the Russian company now insists that the deal could only make sense if it involves operating control as well.'

***Hungarian oil and gas company Mol** is reported to be planning to invest $7mn in 2001 on the addition of four new services stations to its 36-strong Romanian network.*

***Itera has announced plans to build a** 4bn cm/y gas export pipeline from Moldova to Romania, reports UFG. 'This is the first time that Itera has attempted to gain access to Gazprom's non-CIS markets and – even more worrying – to gain ownership over the gas export network. Moldova is the second-largest debtor to Gazprom and is a virtually bankrupt country, comments the analyst.*

Tackling high Norwegian petrol taxes

The Norwegian Petroleum Industry Association (NP) has launched a new campaign against high petrol taxes in Norway, planned and executed in close cooperation with Norwegian oil companies Statoil, Esso, Shell, Hydro Texaco and Jet – all members of NP. Over the past 10–15 years, several increases in taxes on petrol in Norway led to very high petrol prices by the end of the 1990s, states NP. In Europe, only the UK had at that time a correspondingly high level of petrol taxation.

The NP has carried out a number of campaigns against these high taxes over the years. Its 1999 campaign called for no increase in petrol taxes in the state budget for 2000 and increased public knowledge of the magnitude of petrol taxes. The 2000 campaign was supported by statements from leading politicians showing a willingness to reduce petrol taxes – it proved moderately successful with a small reduction in petrol taxes in the national budget for 2001, reducing by NKr0.5/l from 1 January, and a further NKr0.32/l from 1 July 2001. This latest 2001 campaign aims to ensure implementation of the adopted tax reduction and is supported by leading politicians in favour of further reductions.

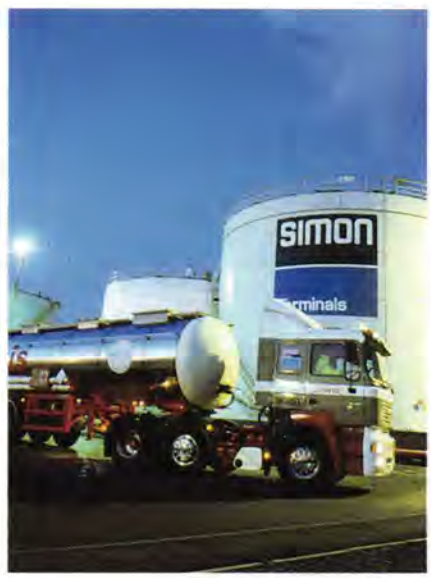
According to NP, tax accounts for 80% of Norway's petrol price. 'Petrol actually costs slightly less than NKr2/l,' it says. 'Around NKr7 in taxes is then added on. Norway has one of the world's highest levels of petrol taxation.' It is calling for petrol taxes to 'never exceed half the price of petrol,' claiming that motorists 'would then save NKr1.5/l.'

RoSPA awards

Simon Storage reports that each of its UK bulk liquids and gas terminals has received a Royal Society for the Prevention of Accidents (RoSPA) award in recognition of its commitment to improving safety. It is the second year that all of the company's UK operations have collected an award.

Simon's Facilities Management division and its newly acquired Lewis Tankers operation also secured awards. The company believes that it is the first transport company to receive a Gold Award in the past 25 years.

Simon's Shannon terminal in Eire improved on last year's performance, gaining a Highly Commended Certificate from the National Irish Safety Organisation (NISO).



UK Deliveries into Consumption (tonnes)

7Products	†Mar 2000	Mar 2001	†Jan–Mar 2000	Jan–Mar 2001	% Change
Naphtha/LDF	213,021	143,447	698,792	448,824	–36
ATF – Kerosene	800,117	884,181	2,226,092	2,378,971	7
Petrol	1,836,193	1,747,293	5,204,415	5,179,119	0
of which unleaded	1,674,101	1,652,961	4,746,413	4,405,143	–7
of which Super unleaded	37,914	39,607	108,852	107,402	–1
of which Premium unleaded	1,636,187	927,499	4,637,561	3,170,420	–32
ULSP (ultra low sulfur petrol)	–	685,855	–	1,566,896	–
Lead Replacement Petrol (LRP)	162,092	94,332	458,002	264,516	–42
Burning Oil	411,576	486,109	1,253,278	1,402,473	12
Automotive Diesel	1,403,014	1,380,274	3,832,313	3,876,508	1.2
Gas/Diesel Oil	636,347	606,530	1,919,617	1,713,131	–11
Fuel Oil	140,308	218,544	463,669	619,994	34
Lubricating Oil	69,564	73,689	200,462	217,835	9
Other Products	785,360	764,000	2,102,936	2,065,182	–2
Total above	6,295,500	6,304,067	17,901,574	17,902,037	0
Refinery Consumption	401,041	362,052	1,311,325	1,110,110	–15
Total all products	6,696,541	6,666,119	19,212,899	19,012,147	–1

† Revised with adjustments

All figures provided by the UK Department of Trade and Industry (DTI)

Between safe play and confusion

Electricity, petrochemicals and gas are top priority in Mexico's energy policy, which is currently being overhauled. However, President Fox's energy agenda is dithering between safe play and confusion, writes *Maria Kielmas*.

Just two weeks after Vicente Fox's spectacular victory in Mexico's Presidential elections last year, his economic advisers spelt out that energy – or more specifically electricity, petrochemicals and, by implication, gas – would be priorities for the incoming Administration. At the recent Summit of the Americas in Quebec in April 2001, President Fox, US President George W Bush and Canadian Prime Minister Jean Chretien, styled themselves the 'Three Amigos,' a sentiment underlining their hopes of greater economic integration and the creation of a North American energy market. But these ambitions are dependent on an overhaul of Mexico's ossified state energy monopolies and significant investment in energy infrastructure. Whatever the plaudits due to Fox for overturning the 71-year rule of the Partido Revolucionario Institutional (PRI), his energy policy is dithering between safe play and confusion.

President Fox has already backtracked on his first attempt to reform state oil company Petróleos Mexicanos (Pemex), in which four of Mexico's private sector businessmen – none of which has direct oil industry experience – were elected to the board. Officially, their appointment was aimed at bringing Pemex on to a more commercial footing and introducing an 'entrepreneurial culture.' Unofficially, this was a first step to introduce private capital into all branches of the company – a development which critics dubbed a 'virtual privatisation.' Justifying the appointments, Pemex Director General Raúl Muñoz Leos said the new directors would be asked to give their opinion on why, for example, Pemex is not selling gasoline in Guatemala or is engaged in an exploration venture with 'X' French company, a clear allusion that opening to private capital was firmly on the agenda.

The four appointees were:

Carlos Slim Helú – Latin America's wealthiest businessman whose personal wealth is put at $10bn. He has been regarded as the top paymaster of the now opposition PRI. His telecom company, Telmex, holds a near-monopoly in Mexico and accounts for about 25% of the Mexican stock market's (Bolsa) capitalisation. In total, companies owned by Slim account for about half of the Bolsa.

Lorenzo Zambrano Treviño – Chairman of Cemex, the world's third largest cement company and Latin America's number one multinational.

Alfonso Romo Garza – The second richest man in Mexico and President of speciality vegetable seed producer Savia. His support for genetic modification has given him the nickname of 'GM King.'

Rogelio Rebolledo Rojas – A Pepsi Cola executive for the past 25 years and Director of Dupont de México, Pemex Director General's Muñoz Leos' former employer.

These directors were to oversee an overhaul of Pemex, whose new priorities are to concentrate on exploration in regions where light crude and non-associated gas may be discovered; fulfil oil and gas supply contracts; improve operational procedures; and change the corporate structure to make the company more competitive in world markets.

According to Muñoz, Pemex is in urgent need of surgery because:

- The company has not grown for the past 18 years. Reserves have fallen between 1989 and 2000 while refining has been stalled. Domestic demand for refined products has grown by 300,000 b/d since 1989, while refining capacity has increased by just 100,000 b/d – meaning the domestic market is increasingly serviced by imports. LPG consumption is 400,000 b/d, of which 120,000 b/d is imported.
- Petrochemical imports have grown from $1.206bn in 1995 to $4,689bn in 2000.
- The tax load on Pemex has grown by 40.8% between 1999 and 2000 and now accounts for 66.2% of earnings.

Clamouring for a say

Mexican business has been clamouring for a say in how state energy companies are run, especially in the wake of sharp rises in gas and electricity prices last year. As Pemex's gas contract this year has demonstrated (see below), the clamour usually results in yet more hidden subsidies to industry at the expense of the state company's balance sheet.

The relationship between Pemex and Dupont de México is just one example of the labyrinth of potential conflicts of interest the new directors would have to face. Dupont is the only company supplying health, safety and environmental services to Pemex, in particular Pemex Gas. The company stepped in following the 1996 Cactus gas plant explosion in Chiapas and demonstratively reduced the accident rate. The appointment of Muñoz Leos, the former Head of Dupont de México as Head of Pemex was described by PRI national leader Dulce María Sauri Riancho as like 'putting the [Catholic] Church in the hands of Luther.'

Critics of the appointments believed they were unconstitutional as well as open to conflicts of interest. Legislators offered a compromise whereby the four businessmen could sit on a technical advisory group but not as part of the board itself. The matter was finally resolved when legislators called on the new appointees to declare their assets, as government functionaries are required to. The four businessmen neither wanted to make such a declaration or account for any decisions they would have made on Pemex' behalf to the Chamber of Deputies, the lower legislative house. President Fox decided in late April to withdraw the appointments and replace them with a number of external advisers, including academics and various, as yet unnamed, industry experts.

A blow to reform

Energy industry players in Mexico see President Fox's backtracking as a blow to energy sector reform. While paying lip service to the concept of free mar-

kets, Mexican private sector business remains ambivalent about energy market deregulation and is successful in pressurising governments.

Mexican gas prices are linked to the US market and the country suffered accordingly from US gas price spikes. When spot prices in Southern California reached $55/mn Btu in December last year and with two gas transportation pipelines out of operation during an unexpected cold spell, prices in the Mexican cities of Mexicali, Tijuana and Rosarito in Baja California hit $20/mn Btu. These cities rely exclusively on gas imports from the US. Industrialists throughout the country started clamouring for a decoupling of Mexican and US gas prices and the creation of a linkage of prices between Canada, Venezuela and the US in order to establish a more equitable price in Mexico.

The industrialists' suggestion never had a chance of acceptance. But after several months of protests and weeks of deliberations, government and industry agreed on 17 January 2001 that Pemex would supply gas at $4/mn Btu, about $5.50/mn Btu lower than its market price at the time. The agreement is for a period of three years. Should the market gas price fall below $4/mn Btu during the period, industrial customers have to absorb the risk. Industry leaders hailed the agreement as 'reasonable,' even though they wanted a better deal from Pemex, such as $3/mn Btu. Pemex claims that its own gas production costs are $2.50/mn Btu, but industry leaders are not happy with this figure saying the company should be producing gas at $0.60/mn Btu. That it does not do so is said to be due to its inherent inefficiency.

But, just one month later, the Energy Regulator Comisión Reguladora de Energía (CRE) bowed to more pressure from industry and modified Pemex's fixed price gas contract. Originally companies were tied into the full term of the contract and a $4/mn Btu gas price. The changes mean that contracted volumes may be altered by up to 10% either way and contracts may be renewed annually, rather than last the entire three years. The change came after some industrialists had threatened not to pay their gas bills or to stop buying Pemex gas. Others have plans to shift production out of the country, which they now perceive to be a high-wage environment, to countries such as China.

LPG price reform

The government hope of reforming LPG pricing is also in ruins. Just three months into office, the new government slapped price controls on the fuel ordering a 7% price cut. A 20 kg cylinder of LPG in Mexico City now costs $11.72 rather than $12.46. The government originally hoped to increase prices monthly by 2% above inflation, forecast to be 6.5% in 2001. The idea was to bring fuel prices to international levels. Mexico has to import 30% of the LPG it consumes with an annual demand of 90 tonnes per capita. This puts it third in world LPG demand ranking following the US and Japan with per capita annual consumption of 324 tonnes and 137 tonnes respectively.

The government had to back down in the face of a public outcry following allegations that five families – the Zaragoza, Fuentes, Garza, Nieto and Uribe – control the national LPG market as a cartel even though they operate under the names of hundreds of different distribution companies. The opposition parties joined in the protests to block the price increases. Last year LPG prices in the capital rose from $8.80 to $12.46 for a 20 kg cylinder. The government's retreat further heightened fears that it may not be able to push through any significant energy sector reform.

Opening to foreign investment

So, when US President George W Bush called publicly upon his Mexican counterpart to open up the upstream gas sector to foreign investment, President Fox had to heed the growing resentment to energy sector reform in Mexico and offer little (public) comment. From the President himself, through to the Energy Secretariat, Pemex and state electricity monopoly Comisión Federal de Electricidad (CFE), officials have adopted a downbeat approach to US calls for Canada and Mexico to help out with its energy supply problems.

President Fox has already called for an increase in gas and electricity links with the US. Energy Secretary Ernesto Martens has mentioned the creation of a number of bilateral working groups to discuss an energy accord with the US, while the 'Three Amigos' announced the creation of a North American energy market working group at the Quebec summit. But whether Mexican reticence is due to the fear of the inevitable nationalist backlash should the country's leaders sing from the same hymn sheet as the US, or due to confusion at the heart of Mexican policy making, is unclear.

Best of both worlds

Mexico's policy-makers have been trying recently to get the best of both worlds, or at least keep relations sweet with its neighbour and main trading partner as well as other major oil-producing countries. Mexico has agreed to cut back oil production in line with Opec's recent decision to cut its total output by 1mn b/d. Such an agreement was already on the cards following the 'mini-cartel' ministers' meeting – Mexico, Saudi Arabia and Venezuela – in early March in Saudi Arabia. Mexico reduced oil exports by 40,000 b/d from 1 April. The reduction will cut 2.3% from the country's current crude exports of 1.75mn b/d.

This marks a distinct shift from policy during the first months of the Fox Presidency when Pemex increased its output to keep prices down. Now that the industrialists are being cushioned by Pemex's gas price deal, they are keeping quiet about the state company's effort to keep prices high. On balance Mexico suffers more from a US economic slowdown caused by high energy prices than it gains from increased world oil prices, but the government is leaving this as the 'great unsaid'.

In Energy Secretary's Ernesto Martens' view a North American energy accord means the free trade of gas, electricity and refined products. He has been at pains to stress that this trade would be in two directions, not just one, meaning that Mexico will be more than just an energy provider to the US. Concerns about the level of Mexican oil and gas reserves and the country's ability or otherwise to meet its internal demands, so poignant during the last months of the Ernesto Zedillo Presidency and the transition, seem to have evaporated over recent months. The government's strategy could be to give the appearance of negotiating from a position of energy resources strength *vis-à-vis* the stranded US market. How long the government can keep up this spin is another matter.

Mexico seems to be trying to avoid the inclusion of an energy accord in the North American Free Trade Agreement (Nafta), the preferred framework for the US. When Nafta was being negotiated during the Bush Sr Presidency, Mexican Government officials were apt to quip that they were going into the talks 'naked except for a pair of socks, and Pemex is the socks.' Any inclusion of energy within Nafta implies to Mexicans that Pemex will be privatised, something both Fox and Martens have ruled out. The only certainty is that any future North American energy accord will be slow in the gestation, probably stumbling at each country's regulatory system.

Oil sands, heavy oil and higher energy costs

Over the last year, prices for natural gas and electricity have risen dramatically in North America. *Petroleum Review* examines the impact these high prices have had on heavy oil and oil sands production in Canada.

The immense trucks that trundle across Syncrude's Aurora mine in Northern Alberta are an emblem of prosperity – each vehicle contains 100 tonnes of oil sand, a mix of bitumen and sand that will be converted into synthetic crude oil, now worth over $27/b.

Oil sands and heavy oil production have become the dominant fraction of Canada's petroleum output. According to the Canadian Association of Petroleum Producers, production of crude oil – light, medium, heavy and synthetic – stood at 2.05mn b/d in 2000. The largest single component, 850,000 b/d, is in the heavy category, another 790,000 b/d coming from oil sands and blended bitumen, and only 410,000 from medium and light crude. And with C$20bn of new investments targeted over the next decade for exploitation of the 300bn barrels of oil sands and 8bn barrels of heavy oil in place, their importance to the Canadian oil patch will continue to grow.

But oil sands and heavy oil require more energy to produce than conventional oil. 'Physics is against this stuff,' says Ian Walker, a Senior Planning and Business Advisor with Imperial Oil's oil sands business unit. 'It costs a lot to get it out of the ground, and a lot to upgrade it.'

Alberta electricity prices, which were relatively stable at between 3 and 4 Canadian cents per kWh throughout 1999, began to rise precipitously in the latter half of 2000 as soaring demand forced the market rates to go over C16cents/kWh. Natural gas prices, which had hovered beneath C$2.50/Gj in 1999, suffered a similar fate – demand from gas-fired generators and low winter storage levels resulted in market peaks of C$17/Gj in December 2000.

High price impact

The impact of high electricity and natural gas prices on non-conventional oil depends on the product and process.

Heavy oil and in-situ bitumen are too viscous to rise unassisted to the surface. The viscosity is commonly reduced either by cyclic steam injection (in which a centrally located well is injected with natural gas-heated steam, creating a high-temperature front), or steam-assisted-gravity-drainage (in which a pair of horizontal wells are drilled, then steam injected into the upper horizontal well to heat the bitumen sufficiently to allow it to drain into the lower horizontal well). In most cases, some form of electrical pump is needed to lift the oil to the surface.

Imperial Oil's major in-situ bitumen extraction project at Cold Lake uses a cyclic steam process to extract the tarry substance from 500 metres below the surface. Industry experts estimate that each barrel of oil produced requires between approximately 1 Gj and 1.4 Gj of natural gas and 20 kW of electricity. At Cold Lake, direct lifting costs per barrel of bitumen produced rose from approximately C$6 in January 2000 (when energy represented 30% of lifting costs) to C$14 in January 2001 (when the energy component rose to 80% of lifting costs). At that time, the differential for bitumen (the discount that refiners charge between light crude and heavier grades) resulted in a commodity price of approximately C$15 to the producers. By the time operating and replacement costs were factored in, oil companies had very little room for profit. 'It was close to break-even point for most producers,' notes Walker.

Oil sands near the surface are typically mined using either draglines and bucket wheels, or trucks and shovels. The oil sands are transported to the processing plant either by conveyor belt or pipeline. The bitumen is then separated from the sand matrix through an extraction process and upgraded in cokers.

Suncor, which produced an average of 113,400 b/d of synthetic oil in 2000, saw its base-plant cash-operating costs increase to C$12.65/b in 1Q2001, compared with C$11.10 for the same period last year. Syncrude, which produced an average of 235,000 b/d in 2000, saw its operating costs rise even further. 'Syncrude's 1Q2001 production costs were around C$20/b,' says Tom Ebbern, a Petroleum Analyst with TD Newcrest, an investment consultancy. 'They've boosted their longer term lifting costs from C$12 to C$16, and it had a lot to do with higher gas prices.'

Fortunately, prices for synthetic crude command a slight premium on the market due to their low sulfur content, and Suncor posted record 1Q2001 profits of C$125mn in spite of the cost increase (Syncrude's 1Q2001 results had yet to be released at time of writing).

Solving a sticky problem

In order to reduce costs, heavy oil and bitumen producers have taken to shutting in some marginal wells during periods of natural gas spikes. 'AEC shut in about 3,000 b/d, but [the total number of shut-in wells] represented less than 5% of total production,' says Ebbern.

Longer-term solutions will require capital investment. 'Canadian Natural Resources is in the process of converting from gas to bitumen on their steam process by installing dual burners,' notes Ebbern. 'If the price of gas is more than C$4/mn cf they will burn bitumen. They calculate that the investment in dual burners has a less than six-month payout.'

Imperial plans to install a cogeneration turbine in the latest phase of development at its Cold Lake field in order to take advantage of the waste heat to generate steam, but the 150 MW plant, which will generate enough electricity to meet all field needs, will only create enough steam for a portion of the wells. 'It could amount to around a 10% savings on energy,' claims Walker.

Even before the recent surge in energy prices, the newest generation of oil sands plants were being designed to be as fuel efficient as possible. Syncrude is investing C$8bn between 1996–2008 in order to double its output to 468,000 b/d of synthetic crude. 'Out of the C$8bn, C$2bn is slated for energy-saving programmes and devices,' says Cherry Holand, spokesperson for Syncrude.

Energy-saving initiatives

Several major energy-saving initiatives are underway in the areas of extraction and upgrading. Traditionally, bitumen has been extracted from the oil sands in a 'cyclo-feeder,' essentially an immense washing-machine in which the oil sands are mixed with hot water and detergent and agitated. Through extensive R&D, Syncrude has lowered the temperature of the cyclo-feeder from 85°C to 25°C, saving on natural gas consumption. In order to further reduce energy input, it has also combined separation and transportation functions into the 'hydrotransport' process, in which the oil sands are mixed with hot water and caustic soda to form a bitumen froth that is sent by pipeline to the main upgrader plant.

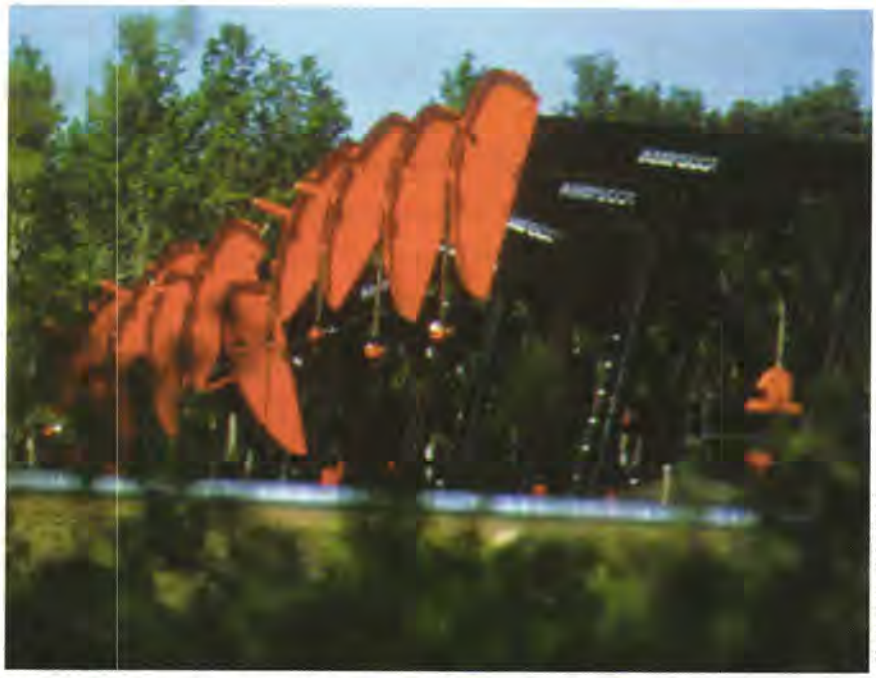


Photo: Imperial Oil Ltd

The Cold Lake production project accounts for about half of Imperial's crude oil production, with annual production averaging 47mn barrels. Multiple wells drilled from surface pads inject high-temperature steam into the oil-sand reservoir and later produce the heavy oil, which is called bitumen.

At the upgrader, the two main cokers have been recently overhauled in order to incorporate the latest efficiencies. A vacuum distillation unit (VDU), which is said to be more efficient than coking, came onstream in 1999. In addition, Syncrude is building a new, 85 MW cogeneration plant.

While electricity prices have settled into the C10cents/kW range, and natural gas remains in the C$7/Gj range, few major projects have been cancelled. Heartened by strong oil prices, Suncor's $2bn Millennium project is nearing completion, and is expected to boost production to 225,000 b/d by year-end. Syncrude has announced no changes to its C$8bn investment programme, and Imperial is continuing the latest phases of its Cold Lake expansion.

Worst case scenario?

What, however, might happen if heavy oil sands and producers encountered the worst of all possible worlds – high electricity and natural gas costs, but low oil prices? 'There would be a short-term dislocation, but the market is amazingly efficient,' says Ebbern. 'If the price of oil fell, the price of gas would fall as well, because [major industrial] consumers would shift to oil. Secondly, the differential price for heavy oil would shrink as well, because there are lots of cokers out there that need a supply of heavy oil. That's what happened in 1998, when the price fell and marginal heavy oil production was shut in. Heavy oil producers were hurting when the price hit $11, but they were doing OK when the price rose to $18.'

Cutting step-out sidetracks

Fraser Lawson of KCA Drilling* and *Fred Van Nieuwenhuizen* of Shell Expro **outline the benefits of through tubing rotary drilling and assess the technical considerations behind the technique's recent use on the North Cormorant platform in the North Sea.**

Following Shell Expro's first through tubing rotary drilling (TTRD) well in the North Sea Brent field (BB-08) in early 1998, two further TTRD wells (CN-18S5 and CN-29S3) were successfully drilled on the North Cormorant platform during 2000.

TTRD is a technique whereby short step-out sidetracks may be performed by drilling a slim (typically $4^1/_8$-inch) hole through the existing completion tubulars. Using this method the christmas tree and completion tubulars are not required to be removed for the drilling operation. A whipstock is set and a window is milled in the existing liner. $2^7/_8$-inch jointed drill pipe is used to drill the well through the completion tubing to a new location. A slim $2^7/_8$-inch liner may then be run and cemented in place before the well is conventionally perforated.

Complimentary techniques

Within Shell's Northern Business Unit (NBU), responsible for the company's North Sea operations, TTRD has emerged as complimentary technique to the more matured coiled tubing drilling (CTD) methodology. Since 1996 Shell Expro's NBU has used CTD on six applications to achieve short step-out sidetracks. CTD has the principal advantage of not requiring a drill derrick to execute the technique and operations may be performed concurrently with main rig activities depending on slot availability. Significant learning about CTD has taken place over the years, with its benefits and limitations now well understood.

Differential sticking with CTD was identified early on as one of the principal risks associated with the method. This has been proven in practice to be the case on some wells. Freeing techniques, such as reducing the hydrostatic pressure, have been less successful than predicted – leading in some cases to hole collapse. With the constraints of the limited overpull capacity of coil tubing and an inability to rotate the string, the inherent risks of the methodology are significant and must be factored in to the economics. Also, a large concurrent window of around 60 days must be identified to realise a CTD well opportunity.

Another consideration is cost. The drilling of a typical CTD well has been difficult to achieve for less than £2.5mn. With rig operating rates declining, conventional wells and TTRD wells using the drill derrick have never been more cost-effective and may be commonly drilled for less than this. By comparison, the two TTRD wells drilled last year on North Cormorant were successfully drilled for £1.5mn and £1mn.

Design considerations

Although TTRD is perceived as a rig-based activity, with the correct sequence planning significant work may be performed concurrently on the skid deck. On CN-29S3 for instance, the existing wellbore was abandoned with wireline plugs and the whipstock set offline using Schlumberger electric line. The main rig was then skidded over to perform the window milling, drilling and liner running phases. Following a drift run to confirm wireline access the rig was again skidded away to other operations with the well successfully perforated offline using 1.56-inch guns. Offline opportunities here ensured that the drilling rig was only required for 18.5 days in total.

TTRD requires slim hole $7^1/_{16}$-inch BOPs (blow out preventors) to be installed on top of the christmas tree. Again, as much rig up and testing as possible is performed offline. A $5^3/_8$-inch wear flange in installed at the base of the BOPs to avoid wear on the christmas tree and valve profiles. Tubing wear with this type of drilling, however, has been generally modelled to be a non-critical design consideration. This has been supported by magnet recovery data and caliper log information from other operators.

A $2^7/_8$-inch drill pipe is used as the primary drill string for drilling through the 5-inch production tubing. A short section of up to 2,000 ft of 3-inch pipe is utilised at the top of the string where 7-inch tubing is positioned. $2^7/_8$-inch Hydril WT-23 drill pipe was used successfully on CN-18S5 and exhibits good drilling properties in terms of joint strength and adequate hydraulics. The internal upsets, however, make it non-receptive to wiper darts and so a separate tubing string had to be picked up for the running of the $2^7/_8$-inch liner. This operation was successful, but required three days to pick up and lay down the liner running string. For the next TTRD well, CN-29S3, the Hydril 533 thread was researched in some detail. Although essentially a tubing thread, this tubular type has a drilling track record and has a plug friendly internal profile with little upset. A string was subsequently sourced and used to both drill the well and run the liner on CN-29S3.

Handling and racking of slim tubulars is a relatively unfamiliar process for rig crews and carries some inherent safety risks. In this respect, an intermediate racking board was commissioned and installed to facilitate the safe handling

Typical North Cormorant TTRD drilling assembly

and racking of slim tubulars.

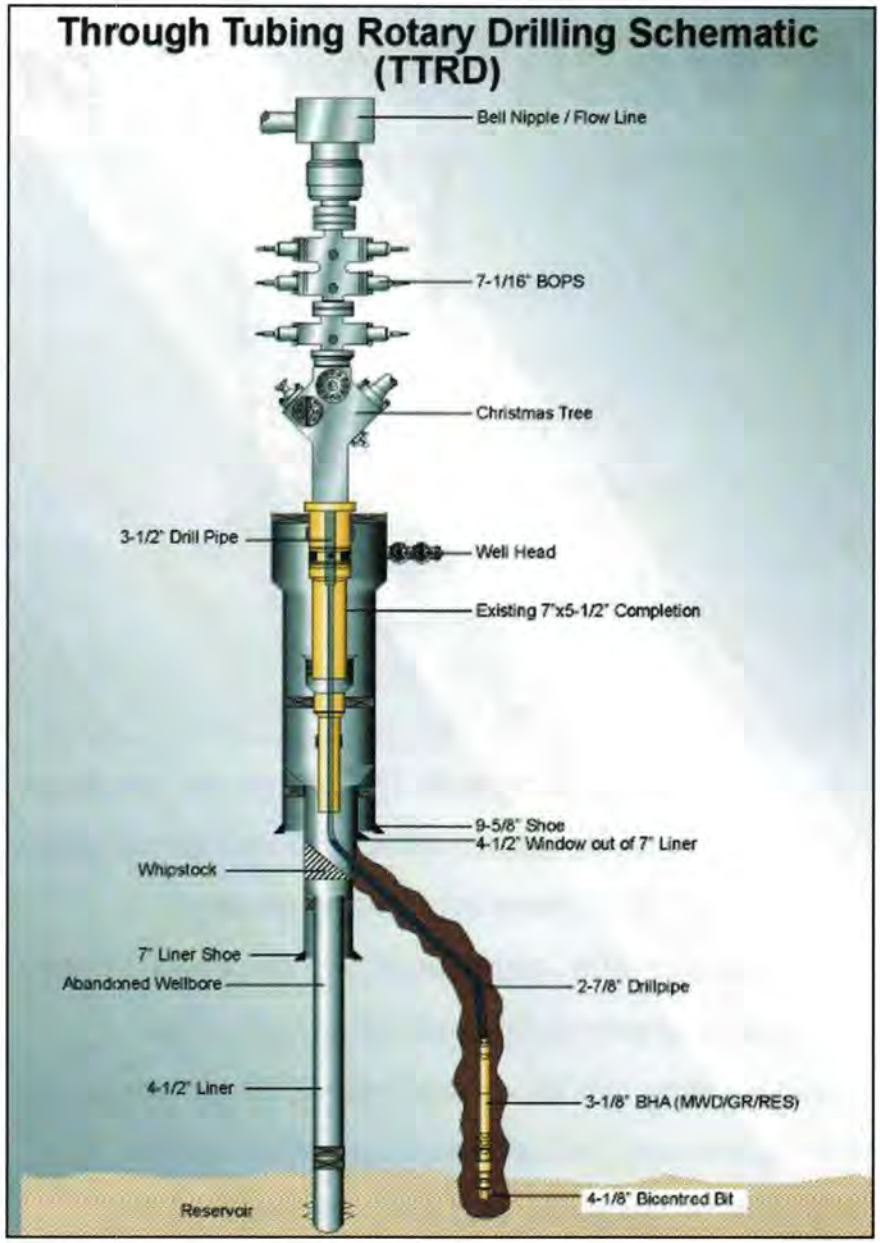
Deviation work in this hole size carries operational risks largely due to the limited data available for different motor, bit, formation and deviation applications, particularly with bi-centre bits. Getting behind on turn also means that very quickly large doglegs are required to catch up on the directional plan. On CN-18S5, for instance, achieving the required 10°/100 ft dogleg was not achieved initially with the bi-centre bit and motor combination selected. Some 15°/100ft or more was soon required to achieve the required target. A more powerful motor delivering 50% more torque plus an increased bend setting was picked up. These assembly changes permitted more effective directional control and the well was aggressively steered to successfully hit the target.

Relative merits

When considering the relative merits of CTD versus TTRD two observed examples highlight some important differences. On CN-18S5 the drill string became stuck briefly while making a connection. Some 30,000 lbs overpull was eventually required to free the pipe. This amount of pull would likely not have been possible with CTD and so the assembly would have been irrevocably stuck if using this technique. Also, cuttings weighing apparatus was put in place for both TTRD wells. On CN-18S5 some 70% of the theoretical cuttings were measurably recovered. Later, during steering work on CN-29S3, the difference in cuttings returns between sliding and rotating modes was clearly seen to fluctuate between 0% and 100% on some occasions. It can be seen that in spite of its merits, CTD cannot achieve the same level of hole cleaning efficiency as TTRD.

Even with good cuttings returns the absolute volume of cuttings for 2,500 ft of $4^1/_8$-inch hole amounts to only a handful of skips. Cuttings disposal via skip-and-ship therefore becomes a viable alternative to cuttings re-injection when using this method – and was subsequently implemented on CN-29S3.

Non-conventional equipment on this type of operation gives rise to a number of potential pitfalls that should not be overlooked. Organising a dedicated bottom hole assembly (BHA) session to physically screw the BHAs together on the beach has proven to pay dividends in terms of recognising handling issues and confirming cross-over compatibilities up front. This session can be conveniently organised with the small size tubulars in question. One additional advantage of small tubulars with make-up torques of around 1500 ft-lbs is that BHAs may be partially made up offline on the deck using hydraulic mini tongs.



One different aspect of drilling through tubing is that some common well control considerations may vary. A slim hole being drilled beneath the completion packer may be regarded as an extended perforation tunnel. The completion tubing is, of course, designed for complete evacuation to hydrocarbons and so the normal kick tolerance parameter becomes less significant from the point of view of allowable well pressures. That said, when the entire open hole volume may comprise only 10 or 20 barrels while drilling, a large loss of hydrostatic pressure with proportionate closed in surface pressures may be quickly induced.

Cost-effective technique

TTRD has been demonstrated as a cost-effective technique for achieving short step-out sidetracks. The two wells drilled last year on North Cormorant had costs as low as £1mn – a first for Shell Expro. Other significant firsts along the way include the UK sector's longest TTRD well at 2,500 ft and the first $4^1/_2$-inch window exit from a 7-inch liner to be performed.

**KCA is the lead drilling contractor to Shell Expro's Northern Business Unit (NBU) and manages drilling operations for all nine NBU platform rigs – Brent A, B, C and D, Cormorant Alpha, North Cormorant, Tern, Eider and Dunlin. Shell UK Exploration and Production (Shell Expro) is operator in the UK sector of the North Sea for Shell, ExxonMobil and other co-venturers.*

A fresh look at pre-drilling

The use of pre-drilling with templates and tie-backs is becoming an optimum choice for marginal fields where additional reservoir data is needed and where drilling to production time needs to be reduced and scheduling risk mitigated. The methodology can be cost-effective when executed by experienced and skilled engineers. *Richard Higham*, of template and tie-back engineering specialist UWG, reports.

During the late 1970s and 1980s, pre-drilling was then increasingly utilised to enhance project economics. For both oil and gas reservoirs, drilling wells whilst jacket and topsides structures were under construction reaped significant rewards. Once wells were tied back and completed, platform production could often be achieved shortly after facilities completion.

With the increased demand for pre-drilling, the major wellhead companies enhanced the mudline tie-back equipment for both jack-up and semi-submersible drilling. Surface wellhead equipment was developed to allow space-out with mandrel type hangers. In addition, pre-drilling template designs were optimised for installation by mobile drilling vessels, which lead to major cost savings in pre-drilling economics.

Platform drilling options

In recent years, with the development of smaller hydrocarbon accumulations and the advent of substantially lighter platforms, there has been an increased tendency to drill through jackets once in position, rather than using a pre-drilling template methodology. These small platforms have a much-reduced fabrication cycle. The perceived complexity and increased costs associated with well tie-backs had made a number of operators prefer platform-drilling options. These preferences were fuelled by bad experiences from early pre-drilling and tie-back campaigns, when issues were less understood and planning was less extensive.

With many technical operations that occur infrequently, limited knowledge and experience often leads to budget overruns. This is particularly the case for template and tie-backs, where many aspects of the equipment and operations occur at the interface between drilling, structural and mechanical engineering. In such instances, the services of a specialist provider can add significant value to the project by identifying risks and remaining uncertainties, as well as optimising processes based on other operators' experiences. An individual operator may carry out a template and tie-back programme in a region every five years or so. In a similar period, a specialist provider experiences involvement in more than 20 times that workscope.

Fresh look at pre-drilling

More recently, however, operators have been re-evaluating the pre-drilling option with regard to their developments. Successful tie-back of wells is now normal where there is adequate planning. In addition, there are a lot of examples of the manufacture of cost-effective drilling templates, of which there are many such examples around the world. With the benefit of experience, a typical rig-installed drilling template is in place within 24 hours, with an average well tie-back taking less than 48 hours.

As the oil sector has matured, field developments are increasingly marginal. Even the larger accumulations have substantial technical challenges and hence reduced economics. Operators are therefore increasingly looking to innovative use of known technologies to reduce costs. Focus with marginal fields is now on the earlier re-use of appraisal wells in order to acquire more reservoir data, and the decoupling of drilling and project schedules in order to mitigate risk and cost over-runs. The increased cost of template and tie-back hardware is often offset by time savings afforded by batch-drilling or completion processes. Refined economic models with monthly cash flow and expenditure profiles are now appropriate for the careful evaluation of pre-drilling. The 'time value' of the money penalty (through discounting) is then less onerous in advancing drilling for compressed field development schedules. This scenario is entirely appropriate for short development schedules.

continued on p 23 . . .

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You are invited to submit papers and posters in the subject areas below. It is important that sufficient information is included in your Abstract to allow it to be fairly assessed. The Abstract must represent the actual paper/poster that will be presented at the Congress. The Abstract must consist of 200–300 words in English, containing no figures or tables, and should be sent to **17WPC@world-petroleum.org** no later than **15 July 2001**, with a clear reference to the Block and Forum number, and the preference for paper or poster presentation. If the Abstract is accepted, the Author will be notified by **15 October 2001** and a full copy of the paper should be sent to the Forum Chair by **1 March 2002** via e-mail only, in Microsoft Word format.

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Setting sights on subsea development

Significant growth is expected in the subsea sector over the next seven years, with 106 pending and probable floating production projects expected to be developed in this period. *Paul H Hillegeist*, President of Quest Offshore Resources, outlines the findings of the company's most recent survey of global deepwater prospects.*

Overall activity in the global oil and gas sector is buoyant, signalling a return to the healthy activity levels experienced prior to the post-1998 slowdown. Oil and gas market fundamentals have never looked better and the medium- to long-term market outlook is very positive. Commodity prices are robust, with Opec holding the line on crude oil supplies and worldwide hydrocarbon demand on the rise. Oil companies, large and small, are beginning to increase their capital spending. Leading industry indicators such as drilling rig utilisation, day rates, drilling and construction permits continue their upward trend.

Quest Offshore's global forecast for deepwater floating production activity points to significant growth over the next seven years. Although market activity in 2000 was generally a disappointment, expectations are for a vastly improved outlook commencing in late-2001, significant strengthening in 2002–2004 and for continued momentum from 2005–2007 (see **Figure 1**). Engineering companies are beginning to experience heightened demand for engineering studies and engineering services. Fabricators, floating production contractors and major marine contractors are starting to see movement on several projects globally, with the realisation of increased bidding activity in 2001 for scheduled installations in 2002–2004. Likewise, many companies are reporting significant improvement to project backlogs.

Future projects

There are 106 identified pending and probable floating production projects worldwide over the next seven years. Some 39% of these projects are located in North America, 27% in Africa/Mediterranean, 15% in Asia-Pacific, 11% in the North Sea and 8% in Brazil (see **Figure 2**).

It is estimated that in each year of this seven-year period there will be between 15 to 22 Spar, TLP (tension leg platform), FPSO (floating, production, storage and offloading) and FPF (floating production facility) installations (see **Figure 3**). These projects are in various development stages, including: 3% awaiting installation, 15% at the pending/construction stage, 13% bidding, 14% in detailed engineering, 13% at the front-end engineering design (FEED) stage, and 42% probable (see **Table 1** and **Figure 4**).

The trend towards deepwater development is increasing, with the present share of ultra-deepwater over 3,937 fsw (feet seawater depth) (>1,200 msw (metres sea water depth)) floating production projects currently at 42% and growing. Of the remaining 61 floating units forecast, 26% are planned for installation in 1,644 to 3,937 fsw (501 to 1,200 msw) and 31% in 1,640 fsw (500 msw).

Market assessment

Over the next seven years, there is a growing share of floating production projects in North America, primarily in

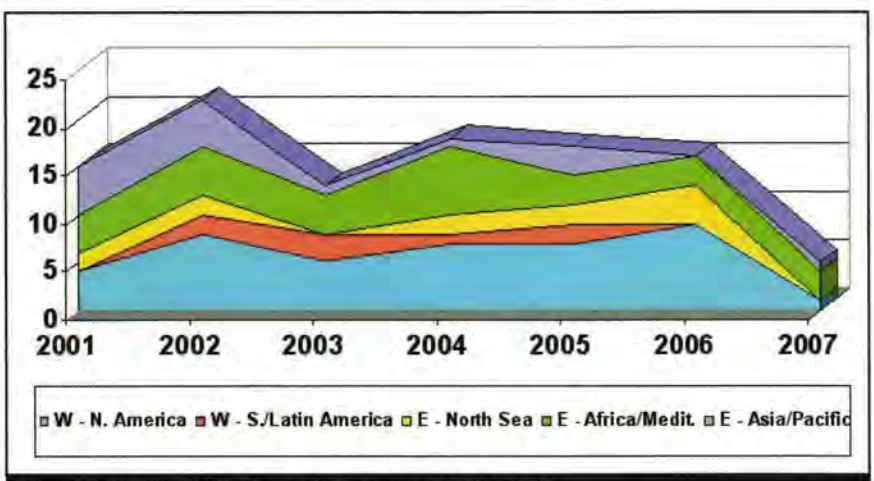

Figure 1: Worldwide floating activity by year 2001 to 2007e

the Gulf of Mexico. The Gulf of Mexico holds a significant portfolio of projects – many leading the way for cost-effective and advanced technological development solutions for ultra-deepwater reserves. Statistics reveal a forecast for 41 floaters in the Gulf of Mexico, 63% of these slated for deepwater projects over 3,937 fsw (>1,200 msw).

The relentless pace for deepwater field development in the Gulf of Mexico continues with the strengthening in the deepwater and ultra-deepwater sectors beginning in 2002. An analysis of deepwater plans and permits for 2000 depict continued growth, with 171 plans totalling 406 wells from January 2000 through December 2000 – or a 28% share of all plans of exploration (POEs) filed with the MMS (US Minerals & Management Service) during this period. There is a measured 21% year-on-year increase in deepwater wells drilled over the last 12 months to March. Further, deepwater drilling activity represents about 11% of all wells drilled, 115, from January 2000 through December 2000.

Several major contract awards for floating production equipment in 2000 and early 2001 have accelerated the pace of activity and benefited fabricators and shipbuilders with $1bn in booked work.

In late 2000, Shell Exploration & Production Company (SEPCO) gave the green light to develop its $1.3bn Na Kika project, which is estimated to recover over 300mn boe. The Na Kika development ultimately will consist of six subsea production systems servicing satellite fields tied back to a centrally located floating production facility, the Na Kika FPS. The six fields are located in water depths ranging from 5,800 to 7,600 fsw (1,768 to 2,316 msw). Production is scheduled to begin at the first five wells in mid-2003.

Korea's Hyundai Heavy Industries (HHI) won SEPCO's contract to fabricate both the hull and topsides of the Na Kika FPS semi in Ulsan, South Korea. Detailed engineering and material procurement is in process, with commencement of facilities construction slated for mid-2001. The unit – designed for a daily processing and export capacity of 100,000 b/d of oil and 325mn cf/d of gas – will serve as a host for between 10 and 12 subsea wells. It will be moored in 6,000 fsw (1,829 msw) at Mississippi Canyon block 474. Installation and first production is scheduled for mid-2003.

BP is extremely active in the Gulf of Mexico with four major developments: Mad Dog, Holstein, Crazy Horse and Atlantis in the ultra-deepwater Green Canyon and Mississippi Canyon areas.

Coflexip Stena Offshore's CSO Aker Maritime won a contract for delivery of multiple Spar floating production platforms for BP's deepwater developments in the region. CSO Aker Maritime will deliver the Spar hulls and mooring systems under a programme calling for up to five units. This award is the largest in scope and value for the CSO Group to date. CSO Aker Maritime will be responsible for the engineering, procurement, fabrication and delivery of the complete Spar hulls and mooring systems. The programme contract calls for the first Spar delivery in 2003 (presumably Holstein or Mad Dog). The contract arrangement also includes options for delivery of additional hulls and mooring systems for BP-operated deepwater prospects (Holstein, Atlantis, etc) in the Gulf of Mexico in water depths ranging from 1,220 to 1,830 msw (4,000 to 6,000 fsw). Options for additional Spars are to be exercised in line with BP's operational requirements. The 'truss' Spar platform solutions to be provided are based on CSO Aker Maritime Deepwater Division's (CSO Aker Maritime) licensed Spar technology.

J Ray McDermott won BP's $600mn contract to fabricate the topsides for four significant deepwater projects in the Gulf of Mexico. The agreement provides BP exclusive access to J Ray's fabrication facility near Morgan City, Louisiana, over the next several years. The $600mn order includes topsides fabrication for the oil company's Holstein, Mad Dog, Atlantis (all Spars) and Crazy Horse (an FPS semi) projects in 4,000 to 6,500 fsw and will create an additional 400–500 new jobs for fabrication workers at J Ray McDermott's yard. Fabrication will commence in 2H2001.

Meanwhile, BP has commissioned GVA to design a semi production unit for its Crazy Horse discovery.

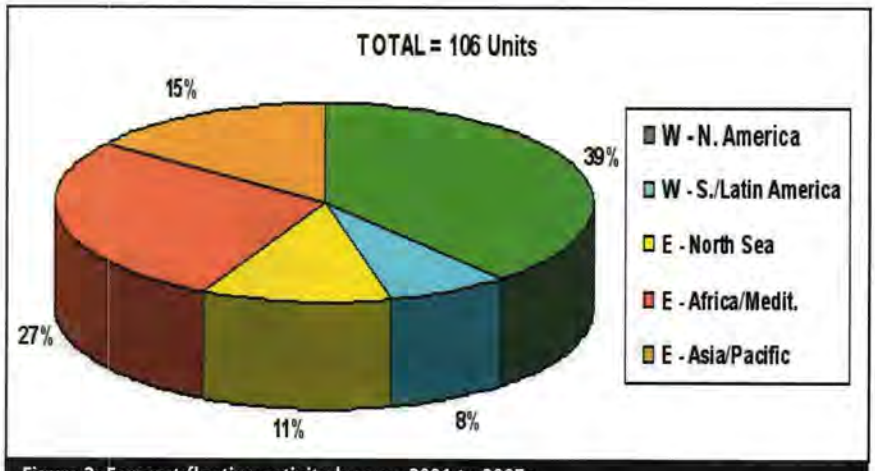

Figure 2: Forecast floating activity by area 2001 to 2007e

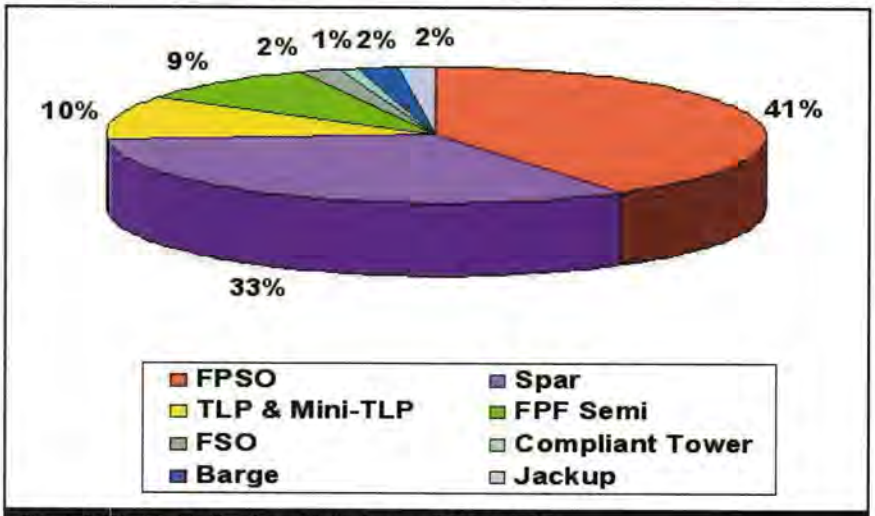

Figure 3: Worldwide floating activity by type 2001 to 2007e

North Sea

Forecast floating activity in the North Sea is characterised by a dozen presently identified floating platform developments split between FPSO and FPF semisubmersible concepts. As of 1Q2001, three North Sea floating production projects were in the FEED stage, including BP's Skarv, Statoil's Kristin, and Norsk Hydro's Ormen Lange (Spar) offshore Norway.

BP and Shell are increasing their off-

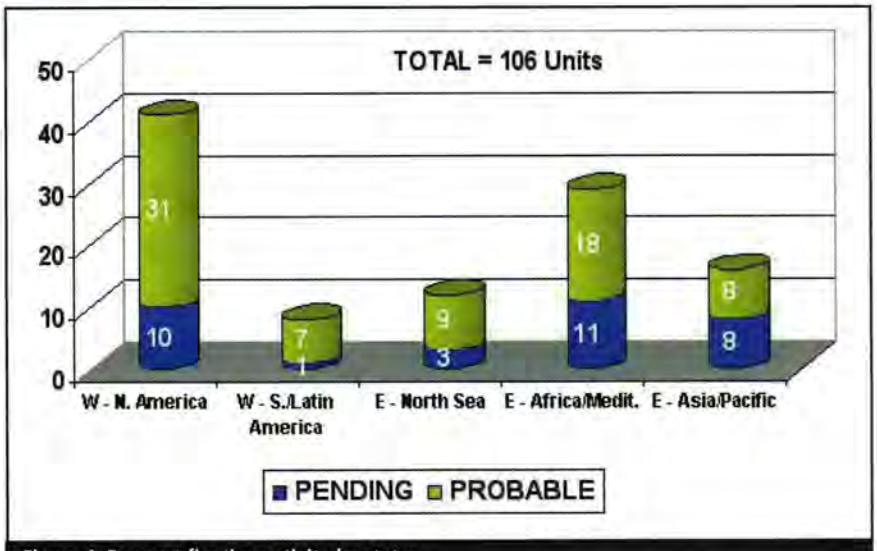

Figure 4: Forecast floating activity by status ©Quest Offshore Resources Inc

shore investment in the UK North Sea. Shell UK revealed a 50% increase in capital spending on exploration and production in the North Sea to about $1.2bn. BP is allocating approximately $4bn towards growth activities in the North Sea and is increasing investment on the UKCS by $930mn.

The UK North Sea still has 50% of its reserves to exploit and subsea technology will play an important role towards the development of these reserves. Increased subsea market activity on the UKCS will be driven by increased utilisation of existing infrastructure through cost-effective subsea satellites. It is estimated that there are over 300 satellite projects offering production add-on opportunities on the UKCS likely to employ subsea and floating production architecture. Moreover, long-term activity in the region will be predicated by the expansion of deepwater developments in the Atlantic Margin and offshore Norway.

In 2000, Kerr-McGee approved the development plan for its $600mn-$700mn Leadon field and the greater Leadon satellites – the Birse and Glassel oil fields located on blocks 9/14a and 9/14b in the UK sector of the North Sea. Greater Leadon reserves are estimated at between 120mn and 170mn boe. The Leadon, Birse and Glassel fields will be developed using 12 or more subsea horizontal wells tied back to an FPSO. Kerr-McGee expects initial production from the Greater Leadon area in early 2002 with peak oil production projected at approximately 50,000 b/d by year-end 2002.

Kerr-McGee believes a floating production, storage and offloading unit is the most efficient, cost-effective and reliable method of development for the Greater Leadon area based primarily on expertise gained in the design, installation and operation of its *Gryphon FPSO*. Kerr-McGee will acquire the Mitsui F-601 hull from Mitsui Engineering & Shipbuilding of Tokyo, Japan. Swan Hunter's Tyneside, UK, yard will construct the topsides, with detailed engineering provided by Brown & Root Energy Services in Aberdeen, Scotland. The FPSO will be christened as the Kerr-McGee *Global Producer III*.

Brazil

Quest Offshore expects to see a continuation of robust activity offshore Brazil. Petrobras is expected to maintain the active pace it has established over the last couple of years with continued phased development projects in the Campos Basin. Additionally, outside operators are establishing roots in Brazil and expanding their licensing opportunities, increasing their drilling campaigns and generally moving forward with their own developments as lead operators in partnership with Petrobras.

The recent tragedy involving the sinking of Petrobras' semisubmersible P36 at the Roncador field will create opportunities for the design and delivery of a new host for this major ultra-deepwater development in 5,000 to 6,500 fsw (>1,524 msw), concurrent with heightened engineering, environmental and safety concerns.

Enterprise Oil is progressing with its $650mn Bijupera–Salema 2 development in the Campos Basin. Dril-Quip will supply 16 subsea trees to the offshore project that is located in about 800 msw. The development scheme comprises a leased FPSO with peak production slated at 65,000 b/d of oil during 1H2003. The FPSO will be capable of processing 70,000 b/d of oil and storing 600,000 barrels.

Enterprise Oil's Business Manager John Martin believes that bringing all the wells onstream simultaneously is the most economical alternative. 'While we are preparing the installations, we have no need of a FPSO in the field. The FPSO will take 20 to 24 months to be delivered, the same time required to drill the 16 wells. If we start the two operations at the same time, all the wells will have been drilled when the FPSO arrives.' Of the 16 wells, 10 will be producers. For the first time in Brazil, the wells will be horizontal and will be connected to two large manifolds, which in turn will be connected to the floater. According to Enterprise, this will reduce the overall project budget for flowlines and risers.

Additionally, other notable floater projects in the region will include the conversion of the tanker *Stena Continent* into an FPSO for Petrobras' Barracuda–Caratinga development,

	Pending			Probable			
	Awaiting install	Pending/ Construction	Bidding	Detailed engr.	FEED	Probable	Total
W – N America	2	5	3	5	4	22	41
W – S Latin America	0	0	1	4	0	3	8
E – North Sea	0	3	0	0	4	5	12
E – Africa/Medit.	1	4	6	4	5	9	29
E – Asia/Pacific	0	4	4	2	1	5	16
Total	**3**	**16**	**14**	**15**	**14**	**44**	**106**

Table 1: Floating activity by status 2001 *to* 2007e ©Quest Offshore Resources Inc

which will be executed on two continents. Jurong Shipyard in Singapore will carry out the modifications to the hull, while a yet undesignated group, probably Brazilian, will fabricate and assemble the topside modules locally.

The contract between Jurong and Brown & Root, the main contractor for the Barracuda–Caratinga FPSO project, is already signed with the work scheduled to take 17 months to completion. After the hull alterations and installation of the process units, the tanker will be renamed *Petrobras 43* (P-43) and installed on the Barracuda field in the Campos Basin. P-43 will produce the Barracuda field in 2,625 fsw (800 msw) at an expected rate of 150,000 b/d of oil, the same as P-48 at Caratinga. Although project costs are unpublished, market sources estimate the budget to be around $75mn for the marine work and $130mn for the process system.

According to Petrobras, the fabrication and assembly of the P-43 processing system will be done in Brazil, giving the project a national content index of 75%. The topside modules will be built simultaneously with the hull in Singapore. As soon as the ship arrives in Brazil, the installation of the topsides will begin. The total conversion of the P-43, according to specialists, could not be accomplished in Brazil, since the Mauá shipyard in Niterói, leased by the Jurong group, does not have a dry dock large enough to accommodate the VLCC (very large crude carrier).

Africa

West Africa holds tremendous potential with major deepwater discoveries as well as numerous 'elephant' reservoirs. Deepwater activity offshore West Africa is beginning to materialise and is expected to skyrocket starting in 2003 to 2004. Projections point to an acceleration of major subsea and floating developments offshore West Africa led by Nigeria and Angola. There are 29 presently identified floating projects in Africa, with 15 earmarked for field developments in over 3,937 fsw (1,200 msw). At present, design concepts suggest 21 FPSOs, six Spars, one FPF, and one compliant tower.

Deepwater projects in the region are characterised by a high number of well counts and significant development cost. Subsea and advanced floating production technologies will play a key role in the advancement and cost-effective development of the many challenging future projects in the region. Angola and Nigeria are experiencing renewed activity levels with several major projects bidding or in process, including Shell's Bonga, Texaco's Agbami, ExxonMobil's block 15 Kizombo, and ExxonMobil's leased FPSO system – 'LPS' – recently awarded to SBM.

Chevron's detailed design competition for its deepwater block 14 Benguela/Belize development offshore Angola reportedly is complete with the development scheme pointing to a compliant tower, FPSO and subsea wells. Additionally, the promising potential of other prospects in the block are likely to designate multiple FPSOs and subsea tie-backs in the field development scheme. Chevron has logged six significant oil discoveries on the block, including Kuito, Landana, Benguela, Belize, and Lobito. Chevron and its partners plan about $6bn in capex over the next five years.

* *Entitled* Quest Deepwater Prospective Quarterly, *the report was published by Houston-based Quest Offshore Resources in May 2001.*

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Egyptian experience

Rashpetco in the Nile Delta executed one of many such projects that have taken place in recent years. This typical, successful pre-drilling project was on the Rosetta field during 1999–2000. As with other accumulations in this area, the development of the Rosetta gas field required completion of the project on time to meet contractual gas delivery dates. With this in mind, it was important to ensure an adequate number of wells could be completed and made available at first production to meet nominations.

After careful consideration of fabrication schedules for jackets and topsides, availability of lift barges in the region and the necessary time to comfortably complete drilling operations, it was decided to proceed with a pre-drilling and tie-back scenario. A nine-slot casing supported template (see photo p18) was located over the first development well by the drilling rig, allowing wells to be suitably spaced out on the unstable seabed. Using the jack-up drilling rig *Key Singapore* a total of four wells were predrilled along with two 30-inch conductors set for use as docking piles. To avoid the bottom bracing and docking pile locating guides of the jacket clashing with the template, the template structure around the 30-inch docking piles was removed by the rig using only ROV intervention, after completion of the pre-drilling programme.

Angular and horizontal alignment tolerances were successfully achieved for the jacket installation. This, coupled with careful inclination control on the predrilled wells, allowed a standard structure and operational tie-back design.

As with the template installation, extensive planning for operation and contingencies allowed the full tie-back programme to be executed within seven days for the four wells, which was significantly under the budgeted allowance.

Cost-effective option

The project demonstrated that new predrilling and tie-back of wells can be cost effectively executed, while at the same time removing drilling activity from the project critical path, mitigating interface scheduling and delayed first production risks. The key to this success is the careful evaluation of historical experience, the appropriate selection of proven technological methodologies and the optimisation of the process through planning by personnel with the necessary competencies.

For further information on UWG's activities please visit the company's website at **www.uwg.co.uk**

Offshore operators catching the fieldbus

A new generation of 'fieldbus' process automation has been adopted for recent offshore projects, such as Malampaya in the Asia-Pacific, the North Sea Snorre B field and the offshore Egypt Rosetta development. Although not a new concept in itself – the fieldbus technology has been used in factories for the best part of a decade – it was not until recently that the technology has been considered mature enough for use on such offshore platforms, writes *Jeff Crook*.

Fieldbus is the latest stage in the migration of electronic intelligence from the control room out to the process plant. Intelligent fieldbus sensors, controllers and actuators are mounted close to the equipment that they monitor and control. These devices are linked by a single cable and exchange digital data by means of a local area network (LAN) that allows regular updates of measured variables and control signals between the various devices within each loop.

The technology permits application programmes to be downloaded to individual field devices and facilitates more sophisticated functions such as remote calibration and diagnostics of field instruments. Further benefits arise from a reduction in field cabling requirements and the simplicity of commissioning. The use of a standard communication protocol also means that the fieldbus loops may be simply interfaced with the distributed control system (DCS) used for plant management.

Whilst there are clear benefits for the technology, the adoption of fieldbus by the offshore industry awaited agreement on standards to ensure equipment compatibility between different manufacturers. There were also a number of petroleum plant issues that needed to be resolved.

Petroleum plant challenge

Profibus (PROcess FIeld BUS) was one of the earliest forms of fieldbus and has been extensively used for factory automation since the early 1990s. But the original version of Profibus was unsuitable for petroleum process plants for two reasons – firstly, the devices could not perform the control functions (such as PID (proportional integral and derivative) functions) that are needed for process plant automation; secondly, the bus was unsuitable for use in 'hazardous areas.' To understand this latter point it is necessary to look at the design of a traditional instrument loop.

A conventional field instrument produces a 4-20 mA (milliamp) signal, with power supplied through its signal cable. The electric power is supplied from a 'safe' area, such as the control room, through an intrinsically safe (IS) barrier. The barrier limits the power in the field cable to prevent the ignition of petroleum products in the event of an electrical fault, such as a short-circuit.

There are alternative methods of protecting electrical equipment in hazardous areas, such as explosion proof casings, but these are far more costly than IS. So it was recognised that a fieldbus solution for use on petroleum plants would need to comply with these IS criteria – which, in turn, placed a strict limit on the power available to operate all the devices within a single loop. The precise power limit for a loop depends on the area classification, but it will be less than a watt.

The Highway Addressable Remote Transducer (HART) protocol, developed by the Rosemount in the mid-1980s, was the forerunner to fieldbus for process plants. In this system, digital data is superimposed on to a 4-20 mA signal. This permits sophisticated functions, such as diagnostics, to be performed by digital signals whilst process measurements are transmitted by the usual method. This system could be made to comply with IS requirements.

But further research and development was needed to create an 'open' international standard which would enable full-blown fieldbus technology to be adopted for major process plant projects. The open standard would ensure that owners were not tied to a single supplier for the working life of a plant, which could perhaps be 30 years or more.

International standards

The design of low-power IS fieldbus products capable of performing process control functions needed to go hand-in-hand with the international fieldbus standards process. This standards process needed to balance the commercial, industrial and national interests of many different concerns. Manufacturers needed to be fairly rewarded for their technology but no company would be allowed to place a stranglehold on the market.

The standards process involved both equipment suppliers and end users, and was carried out under the auspices of world-class agencies such as the Instrument Society of America (ISA), the International Electrotechnical Commission (IEC) and the European standards agency CENELEC.

The starting point for the standards discussions was the Open System Interconnection (OSI) model that allows a network to be divided into seven functional 'layers'. The model approach allows each function of the network to be examined in isolation.

The transmission system (electronic, fibre-optic or radio) is defined by the lowest, 'physical', layer of the OSI model. The model approach means, in practice, that common message formats can be used with different transmission systems. One practical benefit of this is that a simple electronic coupler can be used to transfer data from a fieldbus loop to a faster data network for plant-wide control.

The model that was finally adopted for fieldbus was loosely modelled on the OSI model but had just three components – the physical layer, the communication stack, and the user application.

The two most commonly used fieldbus standards used for petroleum plants are known as Profibus PA and Foundation Fieldbus. It is too early to say which of these systems will dominate in the offshore industry but one expert expressed the view that 'Foundation fieldbus will eventually prevail,' adding that 'Profibus is seen as a Western European initiative.'

Profibus PA

The original Profibus standard agreed in the early 1990s was not well suited to the needs of process plant control, so a new version was developed – known as PROFIBUS PA – for continuous process control in hazardous areas. The PA version was specifically designed to transmit process variables, rather than the simpler on/off signals that characterise factory automation.

Profibus PA utilises a transmission technology defined by the IEC 1158-2 standard rather then the RS 485 system used for the basic version of Profibus. Data is transmitted over a pair of conductors at very low power ratings so the circuit can be designed to meet IS requirements. Diode barriers are used to limit power levels in the bus circuit in much the same way that they are used for conventional instrument loops.

A standard data message format has been adopted which is common to both the Profibus PA and to the faster Profibus DP version. The Profibus DP version would normally be used for higher data transmission speeds for plant-wide automation where it would link computers in control rooms, offices and other safe areas.

Various versions of Profibus are used on the Snorre B floating production platform that is being built in Norway for operator Norsk Hydro. In addition to linking control and automation subsystems, it is understood that Profibus is used for links to field instruments. Siemens was awarded contracts worth NKr80mn for the supply of the platform systems. Profibus is also being used for a high speed data communication system that links Snorre B with its subsea production hardware.

This latter system was developed by Siemens under a separate NKr28mn contract in cooperation with Saga Petroleum. (Saga was operator of Snorre before the company was taken over by Norsk Hydro). The system uses state-of-the-art radio frequency (RF) technology and operates some 40 to 80 times faster than older systems whose speeds would typically be in the region of 1,200–2,400 baud.

The subsea system transmits data over a power cable for distances of over 60 km to several distributed nodes. As this system operates underwater where ignition of flammable gas is not a risk, IS power constraints are not an issue.

'Fieldbus technology is sufficiently mature for use in new and refurbishment projects in the North Sea'

Foundation fieldbus

Foundation is an 'open,' inter-operable fieldbus for process plant control that is covered by European and international standards. The standard was created by the Fieldbus Foundation, a not-for-profit corporation based in Austin, Texas, which is supported by 120 of the world's leading end-users and automation manufacturers. It was established in 1994 after the merger of WorldFIP and North America and Interoperability Systems Project (ISP).

Foundation fieldbus instruments are used on the Malampaya shallow water platform – this was the first offshore order for a new generation of automation based on Fisher Rosemount's PlantWeb architecture and Foundation fieldbus instruments. (See *Petroleum Review*, May 2001).

A similar system of automation was adopted for the unmanned Rosetta platform that started commercial gas production on 31 January 2001. This gas platform is located in 200 ft of water in the Nile Delta and forms part of a $330mn project undertaken by the

The unmanned Rosetta platform in Egypt's Nile delta

Rashid Petroleum Company, a joint-venture company formed between the Egyptian General Petroleum Corporation, BG, Shell and Edison International.

North Sea potential

It is not known whether fieldbus is being used for any projects in the UK sector of the North Sea, but the slow pace of development activity suggests that the technology may make its debut for refurbishment of existing facilities. Shell has taken a keen interest in the subject and has carried out a major investigation into the interoperability of fieldbus products at its R&D centre in the Netherlands. It is now marketing this expertise through Shell Global Solutions.

Nick Curley, Principal Engineer with Shell UK Exploration and Production's engineering consultancy group, says that fieldbus technology 'is now sufficiently mature for use in new and refurbishment projects' but that Shell had not used fieldbus technology in the North Sea thus far – although there are some small Hart applications on Shell's southern North Sea installations.

Curley attributes the benefits of fieldbus to the extra information that the system can convey, and the increased functionality within field units, rather than savings in cabling. He does acknowledge, however, that the reduced footprint in the equipment rooms resulting from the elimination of conventional field I/O cabinets could be a significant benefit in a space confined environment.

The great Norwegian shake-up

After years of debate, Norway has finally taken the plunge and is set to partially privatise state-owned Statoil this month in a move calculated to strengthen the company and make it internationally more competitive. *Jeremy Cresswell* reports.

The partial privatisation of Statoil, coupled with the disposing of 21.5% of the Norwegian Government's stake in offshore oil and gas fields and EU-imposed changes in the way gas is sold and transported into Europe, adds up to the most profound shake-up ever in the history of the Norwegian Continental Shelf (NCS).

But, unlike most privatisations and related disposal programmes such as the UK's, the pressure for change has come primarily from industry – in other words Statoil itself – and from the growing number of international opportunities opening to the resource hungry multi-national oil and gas heavy brigade.

If all goes to plan, between 15% and 25 % of Statoil will be sold via an initial public offering (IPO) in Oslo and New York on 18 June 2001. The company has already been fattened up ahead of the listing via a concluded $4.3bn deal with the Oslo Government to purchase 15% of the so-called State Direct Financial Interest (SDFI).

This adds 400,000 boe/d to its production base, lifting it to around 1mn boe/d and ranking Statoil eighth in the energy multi-nationals league table in terms of reserves – standing at 4.5bn barrels of crude.

Expressed another way, around $1.50/boe is being paid for the SDFI interests which range from as much as 43% of Gullfaks, 32.37% of Sleipner, and 21% of Tordis and Visund, to 6.93% of Troll and just 1.4% of Snorre.

After the listing, Statoil will be allowed to sell off further stakes through forming partnerships with foreign oil and gas firms. However, the Norwegian Government will retain at least two-thirds control.

Although mature, the NCS still has very considerable reserves – decades in terms of oil and generations worth of gas. This position is further reinforced by the fact that big discoveries are still possible... witnessed by recent finds such as Ormen Lange (400bn cm of gas reserves) which is to be developed by Norsk Hydro.

Competitive market

But this still does not guarantee Norway's competitiveness on the international stage. Despite efforts to slash finding and production costs via initiatives such as NORSOK, the breakeven NCS crude is far above competing energy provinces – about $14/b for Norway compared with $3/b in Iran, for example.

This has clearly worried Norway's Oil Minister, Olav Akselsen, who is worried that oil companies now have greater choice as to where they invest and that industry consolidation over the past three years has led to fewer NCS operators.

Akselsen effectively admitted mid-May that the SDFI, which was originally set up in 1985 as a mechanism to avoid Statoil becoming too powerful, had started to outlive its usefulness, was now acting as a brake on progress, and could be cut further in the future.

For now, the stake being sold rests at 21.5%, which means only 6.5% of the SDFI (worth around $2bn) is being offered to Statoil's arch rival, part state-owned Norsk Hydro, and other companies currently active on the NCS.

Norsk Hydro had wanted the same share as Statoil, ie 15%, and lobbied hard to get it. However, the attempt failed and the haggle with others over the 6.5% balance may take months to conclude. Akselsen said: 'Our goal is to have as swift as possible a process, but I don't want to be too optimistic as to when it will be completed.'

He hopes the sale will be completed before the Norwegian general election in the autumn. It will be handled by a new state entity created by Oslo – named Petoro – to assume control of the SDFI, effective 1 June 2001. It will be the largest oil company on the NCS with $65bn worth of assets under its control, and have as its Chairman Tore I Sandvold, latterly Director General of the Norwegian Ministry of Petroleum and Energy.

Gas sales reconstruction

Running more or less in parallel with the SDFI and Statoil sales, Akselsen is also overseeing the scrapping and reconstruction of Norway's EU gas sales machinery.

Today, all gas from the Norwegian Shelf is sold as one package via the Gas Negotiating Committee, which negotiates primarily long-term take-or-pay contracts on behalf of producers – of which Statoil is the largest. However, it seems Brussels will insist that the Committee be disbanded and that companies pursue their own deals.

There is another diktat from Brussels regarding gas, namely that control of Norway's 8,000 km integrated North Sea pipeline network be taken away from Statoil and placed with a neutral state-owned management company. It is designed to ensure fairness of access by all NCS gas producers to the system.

Akselsen said that, although a new gas transportation company had been created, the infrastructure ownership would stay with the companies (mostly Statoil) and that Statoil would continue to run the network on a day-to-day basis. 'Newco will take care of neutrality. This is to avoid giving Statoil too strong a position in the pipelines,' he stated. 'But we have not agreed how the EU will influence the way we sell gas or the [Norwegian] state's right to decide which fields should be developed first.'

Akselsen sees scope for a progressive ramping up of Norwegian gas exports to the EU from around 60bn cm today, to 70bn cm in 2005. The system's current capacity is 90bn cm.

Changing the rules of the game?

The Russian oil industry remains attractive to foreign operators, but the lack of adequate PSA (production sharing agreement) protection is a major stumbling block. But even when the revised PSA terms become law, will cooperation with the newly-rich Russian oil majors require a re-think of future strategy? *Chris Chew* reports.

Oil's importance to the Russian economy was clearly reflected in the 'Fourth Annual Russian Economic Forum' which was recently held in London. There were major presentations from Yukos, Sibneft, Shell and BP. The panel discussion on the outlook for the energy sector attracted a particularly large audience.

Industry transformation

A combination of high oil prices and a certain amount of internal reform has transformed the Russian oil industry since the dark days of 1998. Now, with oil production growing at around 6%/y, compared with domestic demand growth of only 2%/y, oil producers find themselves with an exportable surplus of around 120mn t/y. This generated export revenues of around $2bn last year and, according to an estimate from Aton Capital group, net profits of the top five companies more than doubled to a record $14.2bn.

The oil price windfall has transformed the industry's short-term prospects, allowing it to now raise production and profits by investing in more efficient production methods. However, this new-found wealth may also change the relationship between domestic and foreign companies.

Foreign partners

Within Russia, joint ventures with foreign partners have often been seen as a necessary evil – necessary in order to gain access to foreign capital and technology, evil because ownership of Russian assets was lost to outsiders. On the other side, foreign companies have found doing business in Russia less than easy, but justified by Russia's large and relatively cheap reserve base, an underdeveloped domestic market and longer-term opportunities to develop new supply chains to China, Turkey and other neighbouring markets.

But, as both Shell and BP stressed in their presentations to the Forum, foreign operators – and their bankers – need the long-term stability and protection that only a properly drafted PSA law can provide. Failure to provide this protection could mean Russia losing its share of foreign upstream investment to other countries if foreign operators cannot obtain the necessary legal and fiscal guarantees.

On the Russian side, the PSA law has been caught up in the continuing battle for supremacy between the reformers and the conservatives. A 'new' PSA law was drafted in the early 1990s but, because of Duma opposition, was only passed in January 1999. However, the law – which only passed because of the economic crisis – contained so many restrictive aspects, including 70% local content and excessively strict field eligibility criteria, that it was essentially unworkable.

The pendulum has now swung back in favour of reform and the Putin Administration hopes to generate $85bn though foreign oil and gas investment over the next five to seven years. German Gref, the architect of Russia's latest economic reforms and Head of the powerful Ministry of Economic Development and Trade, has taken over many of the powers previously exercised by the Energy Ministry. The PSA has also been re-drafted to eliminate most of the ideological provisions of earlier versions. However, the new version, originally scheduled for early 2001, has also encountered problems and, although a final version is promised before the end of 2001, few are betting on it.

New law

The new law, following the Norwegian model, proposes that the Russian counter party for all joint venture projects should be state-owned Rosneft. This, theoretically, should speed up approvals and improve ownership transparency. However, it also means increased counter-party risk as Rosneft is perceived as financially weak and incapable of fulfilling major financial obligations without the backing of the government.

In fact, the funding issue as whole remains one of the least resolved of all the outstanding PSA proposals. There is still no agreement on the definition of recoverable costs, on whether legitimate costs can be disallowed after the fact, or on allowable cost carryover. The experience from the four original PSAs (covering the onshore fields of Khoryaga and Samatolor, and the two offshore Sakhalin projects) suggests that, unless definitions are very clearly defined, excess costs can mysteriously end up the responsibility of the foreign partner.

Strategy rethink?

While the government, in a bid to raise taxable revenues, is actively trying to push the PSA law forwards, the attitude of the Russian oil companies seems less enthusiastic. The President of Yukos' E&P division, when interviewed by *Petroleum Review* in the May issue, said that the current PSA terms were favourable to efficient companies and that foreigners should not expect further concessions. With bulging export revenues and the Energy Ministry less likely to impose arbitrary export quotas and tariffs, the Russian producers appear to have renewed confidence in their ability to go it alone with major projects.

External financing is always easier when balance sheets are strong, while outsourced technology and other services are always available to cash buyers. As these were the areas where foreign companies could, in the past, make the biggest and most immediate contribution, the increasing ability of the Russian industry to provide for itself could greatly change its relationship with foreign oil companies.

As Russian companies, flush with hard currency reserves, become more outward looking, the value to be added by foreign partners could come more from greater strategic cooperation, rather than production-related assistance. This could include access to overseas markets, greater involvement in cross-border projects and perhaps more downstream and chemical cooperation.

If so, the foreign oil majors may have to re-think their Russian strategy, and perhaps also be prepared to make more space for the Russian majors in the international oil arena.

Optimism, realism and a warning

Many British visitors to the 33rd Offshore Technology Conference (OTC), held in Houston in early May, seemed surprised by the genuine optimism that characterised the conference and associated exhibition. *Philip Algar* reviews some of the highlights of the event, which attracted 2,185 companies – including 202 from the UK, the highest number after the US.

Once again, the deepwater of the Gulf of Mexico was heralded by the dominant American companies as cause for major optimism. In contrast, the North Sea too has reached maturity, but seemingly lacks the second life granted to the Gulf. The US industry is also confident that the new American administration will be more sympathetic to the oil sector as the country seeks a way out of its major energy problems.

The increased buoyancy of the sector internationally was reflected in the attendance. Last year, 43,758 people visited what is said to be the world's biggest oil and gas conference and exhibition. This year, the total was 47,649, the second highest since 1985, and they came from more than 80 countries. Floor space occupied, at 400,000 sq ft, was the highest for 16 years.

Realism

In 2000, it was thought that e-commerce would take over the world – transforming all in its path while those who lagged behind the so-called leaders were denigrated as commercial dinosaurs. Now, 12 months on, with the demise of so many of the new groups, there was a totally different outlook.

The faith in the potential of the new concepts to change business fundamentally remains, but it is now recognised that steady progress is preferable to a headlong and unthinking charge. Indeed, some exhibitors stressed that their approach was to avoid electronic transactions for goods and services – instead they were harnessing the power of modern technology to sort out huge amounts of information, ensuring that it was up to date and then offering it, instantly, in the customers' required format.

For example, Energy Web, which is based in Aberdeen, is an independent Internet portal and search engine for the energy sector which allows the provision of efficient and speedy information on a range of topics, including news, career development and international supply source directories.

OneOffshore, recently created by the merger between Petrodata and Offshore Data Services, announced that it is to launch RigInsight this month. A web-based non-transactional platform designed to increase asset efficiency and utilisation in the global offshore mobile rig market, it will offer real-time access to the market. Users will be able to assess the history and availability of rigs, by type, by region, instantly. The company maintains that this will help fleet utilisation because, for example, some deepwater rigs are being used in shallow depths – a waste of resources. It is estimated that the sector wastes about a quarter of its $10bn annual spend as a result of suboptimal rig usage.

A warning

However important the exhibits and technical presentations at OTC, perhaps the most significant contribution came from Matthew Simmons, President of Simmons and Co. International, a specialised energy investment banking firm.

The oil sector occasionally produces articulate thinkers who are not content to acquiesce in the consensus views. Professor Peter Odell, for example – who happened to be right on the North Sea outlook – was one such individual, and Simmons could equally prove to be correct in his views on the short-term outlook. His thesis is that there is a shortage of spare capacity across the energy sector and that massive action is required to overcome its consequences. According to Simmons, many in the industry deny that there is a crisis 'but, because they are part of the industry, that does not mean they are right... many pundits in both Europe and America passionately denied a political crisis existed even as Germany invaded Poland,' he commented.

Simmons contended that the world has 'accidentally' used up all its spare capacity to meet increased energy demand. In the US, this had coincidentally happened in oil, natural gas and electricity, resulting from 30 years of energy mistakes. For two decades, the energy complex undertook virtually no real expansion, being pre-occupied with downsizing to become small enough to cope with prices that were too low. This convergence created a 'perfect energy storm.' The world cur-

rently consumes 180mn boe/d of energy and providing the new capacity to meet an increase of just 1% could take up to 10 years.

Despite record numbers of rigs drilling for gas in North America, the gas supply base refuses to grow and the spare capacity of about a fifth in the US power generation sector had been almost totally eroded by increased consumption. There was also a lack of spare capacity in oil production. At its peak, according to Simmons, it was possibly 20mn b/d. Now, nobody presumes that there is any significant shut-in capacity outside Saudi Arabia where the volume could be 1.8mn b/d. However, the oil minister, offering this figure, warned that it could take up to 90 days to bring this onstream. Simmons noted that 'it does not take 90 days to turn on a wellhead valve. Even if this volume could be brought on overnight, the world is now out of spare tanker capacity, spare refinery capacity in most parts of the world, spare pipeline capacity and spare tank farm capacity.' Furthermore, the industry work force was also ageing.

The spare capacity has been eroded by soaring demand and under-investment in additional supply, so the slightest bad news could prompt global energy shortages. 'Rebuilding a safe cushion of spare energy capacity will take at least a decade. In the meantime, we face a meltdown of our economy if anything goes wrong,' he said. The only solution was offshore oil and gas, but even planned developments would be inadequate so they would have to be supplemented by more nuclear energy and coal.

Simmons favoured the reconstruction of a cushion of spare capacity of about 30% that should then be sustained. However, the present energy infrastructure is old and decaying so the existing energy base has to be rebuilt, in addition to adding the 30% cushion. The cost, at least $5tn, could exceed that of rebuilding Europe after the Second World War. 'We are about to enter an energy war and the energy industry is as ill-equipped to wage it as the free-world countries were to wage World War II at the end of 1939... the world has a serious energy crisis on its doorstep.' A failure could easily destroy our economies.

Robots as co-workers

Halliburton and Intelligent Inspection Corporation (IIC) are to develop, market and deliver robotic technology to the hydrocarbons sector. The group reported that this new technology is expected to reduce oil and gas operational costs significantly, particularly in deepwater regions such as the Gulf of Mexico, Brazil and West Africa.

IIC has developed several systems that will be adapted for the energy industry, including an intelligent robotic device, MicroRig, which operates autonomously in the wellbore of a producing oil or gas well. The first line of products, based on MicroRig, will consist of several wireless systems capable of performing downhole measurements and operations. According to the group, the systems, which are targeted for initial use within horizontal and highly deviated wells, will be significantly more cost-effective than current tubing-conveyed methods associated with well-logging and intervention.

The MicroRig is an untethered device that can travel miles into and out of the earth through boreholes. It is a wireless downhole tractor that incorporates advanced logic control software and the device will allow 'smart interventions' to be performed in existing wells. Additionally, the technology can complement smart well technology by providing a means of diagnostic measurements, as well as routine maintenance.

Here and there

- Petrobras won the annual OTC Distinguished Achievement Award for Companies, for its work on the Roncador field, whilst the individual award was presented to Howard Shatto for his studies on dynamic positioning.

  Philipe Richstul, President of Petrobras, addressing a press conference, conceded that the group's safety record was inadequate, especially after the loss of 11 lives on the sunken P-36 platform that had incorporated the latest technology. The company had been slow to modernise refineries and if it was to become a global company it had to have an excellent environment and safety record, he said. Clients did not want companies that did not practice state of the art. The necessary levels would be achieved by 2003 and many international consultants were now working with Petrobras to change the culture, he reported. A budget of $1.3bn was available and progress was being made – but it would take time. The group had not spent this kind of money before and must now compare itself not to other Brazilian companies but to world groups.

- Schlumberger and ABB announced that they are to set up a joint venture, Syntheseas, a London-based company, to 'create integrated upstream solutions for subsea oil and gas development.' Halliburton subsidiary Landmark Graphics signed a definitive agreement to acquire Magic Earth, a 3D visualisation and interpretation technology company, for about $100mn. John Wood Group has bought Bexton Australian Pty and Bexton Holdings Pty Ltd, which provide brownfield engineering and project management services to many groups operating on the North West Shelf, to form a new company – Bexton-Wood Pty Ltd.

- Rilwanu Lukman, formerly the Opec Secretary General and a Nigerian Minister, now an Advisor to the President and Alternate Chairman of NNPC, argued that the emergence of democracy in Nigeria had major repercussions for the oil sector. It would mean the end of discretionary licensing and international investors' perceptions of Nigeria and its government would change. The behaviour of government and its agencies would become more transparent. Every aspect of the Nigerian industry had to be reconstructed and reformed.

- A 'global energy summit' – attended, *inter alia*, by the Oil Ministers of Algeria and Angola and Chief Executives from Schlumberger, Kerr-McGee, PdVSA, and Baker Hughes – agreed that the greatest challenges for long-term sustainability were continued market volatility, precipitated in part by financial markets treating oil as a commodity, critical labour shortages and access to new resources.

- Many companies expressed concern about personnel resources. Margaret Carriere of Halliburton noted that the 'baby boom' generation was about to retire and said that this represented the departure of substantial experience. By 2007, the industry would lose 60% of its experienced talent. 'We're all struggling,' she said.

- The Vice Minister of the Ministry of Energy and Mineral Resources, Kazakhstan, Nourlan Kapparov, surprised experienced journalists at a press conference by claiming that the country's recoverable reserves in the Caspian were 70bn barrels and that the recovery rate was one-third of those in place. The second well has only just been completed but the Minister based his forecast on extrapolating trends from the onshore Tengiz field.

Orinoco producing tomorrow's oil

Venezuela's Orinoco Belt is claimed to hold half of the world's reserves of heavy and extra-heavy crude. *Priscilla Ross* reports on the four major projects that are currently being developed.

The Orinoco heavy oil belt, or Faja Orinoco (tar belt), is the world's largest hydrocarbon deposit. The heavy oil province holds an estimated 1,360bn barrels of heavy crude in place in a 21,480 square mile (55,000 sq km) area north of the Orinoco River in Venezuela. Despite its vast size, recoverable reserves are put at only 272bn barrels, or 20% of the total – even using today's state-of-the-art technology. However, there are currently four multi-billion dollar projects, accessing 3.5% of this resource, that are beginning to contribute handsomely to the Venezuelan economy. The four projects – Petrozuata, Cerro Negro, Sincor and Hamaca – are projected to be producing close to 600,000 b/d by 2005. Each of the four projects will have a dedicated upgrader to convert the heavy oil.

These Venezuelan extra heavy oil deposits were first discovered in the 1930s and the first well was drilled in 1936. It took another 60-odd years before technological advances in production and refining for these capital intensive projects to reach economic viability. As a rule of thumb, every $1 advance in the oil price adds $1bn to Venezuela's oil export revenues – which amounted to $22.45bn in 2000 against $16.30bn in 1999. Venezuela's GDP has grown from $59bn in 1990 to $102bn in 1999. In the same year, the country held 7% of global oil reserves, according to BP's 2000 *Statistical Review of World Energy*.

Each of the strategic alliances developing Hamaca, Petrozuata, Cerro Negro and Sincor (located in adjacent parts of the Orinoco Belt) links international expertise – in financing and technology – to Venezuelan skills and local know-how to the joint ventures. Each involves a joint venture between the state oil company Petroleos de Venezuela (PdVSA), typically taking at least a 30% stake in the farm-in with international oil majors (although this percentage can be higher).

Petrozuata project

The $2.5bn Petrozuata project is a joint venture between US oil major Conoco (50.1%) and state-owned PdVSA (49.9%). It is the first heavy oil commercial venture in the Zuata region of the Orinoco heavy oil belt.

Drilling on the 55,000-acre (23,000 ha) tract began in 1997, with first oil achieved in August 1998. Current production from Petrozuata stands at 120,000 b/d of oil, although the facility has been designed to be expanded to process 150,000 b/d when necessary. Over 320 wells have been drilled to date, with a further 750 planned in order to tap the 1.6bn-barrel field over its 35-year life. According to Conoco Chairman and Chief Executive Officer Archie Dunham, Conoco's 'experience in heavy oil production, refining and coking offered keys that could unlock the Orinoco's valuable natural resource.'

The extra heavy crude, mixed with diluent, is transported through a 36-inch (90 cm) pipeline system some 120 miles (200 km) to the José upgrader on the northern coast. At the upgrader, the diluent is separated from the crude oil and returned to the field though a second, 20-inch (50 cm) pipeline for reuse.

The two parallel pipelines – claimed to the first private lines to have been built in Venezuela in more than 20 years – have a current capacity of 200,000 b/d, which can be expanded to 500,000 b/d. Maria Lizardo, Petrozuata's President, comments that: 'The [dual] pipeline has sufficient capacity to transport oil production from other companies working in the Orinoco Belt and agreements are being negotiated to make this possible.'

The José upgrader has the capacity to process 120,000 b/d of extra heavy crude (9° API), turning it into 103,000 b/d of lighter, medium-gravity synthetic crude for use as conventional refinery feedstock.

PdVSA will utilise some of the refinery feedstock to produce gasoline and diesel for the Venezuelan domestic and export markets. The rest of Petrozuata's production will be shipped in double-hulled tankers to Conoco's refinery in Lake Charles, Louisiana, for processing into high-value products. The acidic crude unit at Lake Charles was commissioned in December 2000 and currently processes 60,000 b/d of heavy crude. The unit will process Petrozuata's syncrude once full-scale production at the upgrader is reached.

The Petrozuata project dates back to late 1991 when Conoco and Maraven, a PdVSA subsidiary, began studying the feasibility of producing and upgrading Orinoco extra-heavy crude.

Figure 1: Heavy oil production in the Orinoco Belt

Doubling Cerro Negro output

Production came onstream at the Cerro Negro field (ExxonMobil 41.67%, PdVSA 41.67% and Veba Oel 16.66%) in 1999 at 60,000 b/d. The extra-heavy crude is being blended with condensate to help it flow to storage and loading facilities at the José industrial complex. Production is expected to double to 120,000 b/d in 2001, when the coker will upgrade the 8.5° API gravity crude in the field to 16.5° API gravity crude. Most of the crude will be shipped to the

Project/reserves	Cost	Partners	Pipeline*	Upgrader	Peak production
Hamaca – 30bn barrels; 2.1bn recoverable; 35-year life	$3.5bn	Phillips (40%); Texaco (30%); PdVSA (30%)	165 km and 55 km long	$1.011bn; onstream 2004; 190,000 b/d; 26° API	190,000 b/d 2004
Petrozuata – 1.5–2bn barrels recoverable; 35-year life	$2.5bn	Conoco (50.1%) PdVSA (49.9%)	two parallel; 200 km long; 200,000 b/d capacity	$1bn–$1.44bn; 103,000 b/d; 22° API	150,000 b/d 2002
Cerro Negro – 1.5bn barrels recoverable oil	not available	ExxonMobil (41.6%); PdVSA (41.6%); Veba (16.66%)	180 km	120,000 b/d in 2002; 16.5°API	120,000 b/d 2001
Sincor – 35 years	$4bn	TotalFinaElf (47%); PdVSA (38%); Statoil (15%)	not available	Upgrader completed late 2001; 180,000 b/d	200,000 b/d 2002/2003

Some pipelines will be owned solely by each of the projects, others were already in place and a tariff or equity purchase interest in the existing line may be made in order to make use of them.

Table 1: The Orinoco heavy oil belt

Chalmette, Louisiana refinery (owned by ExxonMobil and PdVSA) for final processing.

Sincor project

Overall investment for production, upgrading and marketing of the extra-heavy crude from the Sincor project is put at $4bn. Early oil was produced in December 2000. TotalFinaElf is the major shareholder (47%) and acts as operator of the project, which has PdVSA (38%) and Statoil (15%) as partners.

Around 40,000 b/d of extra-heavy 8.5° API crude will be blended with 25,000 b/d of light 30° API crude to obtain 16° API crude to be marketed internationally. This will begin in late 2001 when the José upgrader, now under construction, is completed. Production will gradually build up to 200,000 b/d, which will be upgraded at the José facility to 180,000 b/d of high quality synthetic crude oil with an API of 32°. The so-called Zuata Sweet will have a very low sulfur content. First exports are scheduled for early 2002.

Hamaca project

Hamaca is the second largest oil resource in Venezuela. It came onstream in early 1999 with an initial production of 36,000 b/d and is now expected to build up to full production of 190,000 b/d in 2004, well ahead of the original timetable which stipulated 200,000 b/d by 2006. The project has a field life of 35 years, during which time around 2.4bn barrels of oil will be recovered using today's technology.

Hamaca's 8°–10° API oil will be transformed into lighter 26° API gravity oil, which resembles Alaska North Slope crude. Hamaca's upgrader will cost $1.011bn, with an additional $62.45mn to be spent on field production facilities. Awards have so far been made for major engineering, procurement, and construction contracts worth $1.074bn. The $62.45mn contract figure is only for the initial field/production facilities. There will be other expenditure in later years of this project.

Venezuelan content represents around two-thirds of total expenditure. The contractor consortium for the upgrader is being led by US-based Fluor Daniels Corporation and a consortium led by Inelectra/Parsons for field production facilities.

The $3.5bn Hamaca project's contribution to Venezuelan GDP is reckoned at 0.7%. Encompassing some 657 sq km of the Orinoco in the state of Anzoategui, Hamaca is chronologically the last of the four big heavy oil projects to be fully developed. It has also benefitted from the experiences of Petrozuata, Cerro Negro and Sincor, and is said to be one of the most profitable projects in the country.

Phillips, PdVSA and Texaco are seeking a joint project financing for the Hamaca project. Commercial banks, export credit agencies and the capital markets will also be targeted over the next few years but, at the time of writing, there was no financing in place for the project.

Production process

The Hamaca project has been planned in three phases. The first phase, announced in December 1996, involved basic engineering and was scheduled to begin as soon as project approval from the Venezuelan Congress was finalised – which happened in June 1997. The second phase comprised construction of the first upgrading module, pipelines and associated production facilities, which began in 3Q2000. During the construction phase, early production of heavy crude oil has reached 36,000 b/d, which is being blended with 20,000 b/d of lighter (26°–30° API gravity) diluent oil. The resulting 16° API gravity is then transported to José for export. Expansion of upgrading capacity is the milestone of phase three, when production is due to rise to 190,000 b/d in 2004.

The viscous heavy oil from Hamaca is being brought to surface using long horizontal wells and downhole pumps. Venezuelan heavy oil is naturally heated, laying over a natural geological fault, which provides the commercial advantage of lower lifting costs. Horizontal development drilling is scheduled for 2001. The production wells will have 2,000–3,000 ft (610–915 metres) vertical sections, then purpose-built rigs will drill horizontal sections up to a mile (1.6 km) long in order to maximise production. The oil is trapped in various discreet reservoirs, which makes the horizontal drilling of such long laterals even more challenging.

Later in the project's life cycle the heavy oil will be mixed with 47° API naphtha blend diluent to facilitate 165-km pipeline transport to the José industrial complex where the diluent will be recovered and the crude will be processed. Jose is effectively a first-stage refinery process to produce a lighter crude.

The Hamaca project is a partnership between PdVSA (30%), Phillips Petroleum Company (40%) and the proposed mega-major ChevronTexaco (30%).

Challenging times for North Sea independents

As many of the oil majors rationalise their North Sea portfolios, increasing opportunities have arisen for smaller independents to establish a production base in the region. A recent conference looked at this issue, and outlined how future development of the North Sea needs to be somewhat different than in the past.

The Royal Bank of Scotland's 'Oil and Gas Conference 2001' held in London on 5–6 April brought together all the key players who together have developed a new breed of independent in the North Sea. The coincidence between the 1998–1999 collapse in world oil prices and the maturity of the North Sea, together with unprecedented corporate consolidation in the sector, has significantly changed the future direction of the basin's development. Large and super-major corporates have started a process of rationalising their asset base, which has led to a number of asset disposals and opportunities for small independents to establish themselves with a production base in the North Sea – a process that looks set to continue.

The conference addressed the main issues specifically relating to these new entrants. The most important of these appear to be asset availability and valuation, abandonment, infrastructure access and control, and availability of finance. Various impediments to asset disposal were reported to have recently reduced the number of asset sales – but there seemed to be a consensus that asset availability would increase in future.

It remains to be seen what the level of further rationalisation of assets from the recent mega-mergers will be. However, as the regulatory restrictions of asset disposal recede, perhaps at a time of lower oil prices, fiscal change and real investment opportunities internationally, then the environment could turn again to being a buyers market. Availability of new abandonment products, issues of personnel shortages and new technology could further help the change from big oil to small independent, it was suggested.

Different approaches

A session dedicated to presentations from the various new entrants highlighted a number of focused, but somewhat different, strategies. Of note was the contrasting styles adopted between Consort Resources and Highland Energy, two recent start-ups with a single-minded approach to exploiting value from gas assets in the southern North Sea. Whereas Consort was very much concerned with the mid-market opportunities, Highland was looking at value in the sub-surface.

Lord Moynihan, Chairman, Consort Resources

Peter Sutherland, Chairman, BP

ATP presented reasons for exporting its business model developed in the Gulf of Mexico into the North Sea. This involves value sharing and exploiting another niche – the proven undeveloped reserves. Venture Production, on the other hand, had a refreshing approach to management, whereby all stakeholders may benefit with a win–win strategy facilitating progress on reserves exploitation and maximisation.

It seems that every company has exploited its own individual niche and, in some senses, there was little overlap. Other newcomers to the basin saw the UK opportunity as part of an international strategy – including Paladin and DNO.

Available finance

A range of presentations from providers of finance and financial services showed that there is money readily available for this new sector – providing the company had a credible story. However, it was obvious that in today's market there was a risk of overpaying, with there being more buyers than sellers.

The risk inherent in this class of asset, namely the mature asset, was addressed

and it was highlighted that despite a better understanding of reserves, commercial risk is potentially higher as a result of the short-life nature of the assets and the lack of refinancing capacity. Although senior debt is readily available against cash flow from assets, there is an upper limit which reflects the aggregate risks associated with reserves, an ageing infrastructure and the possibility that if something goes wrong, there is potentially not enough value in the asset to invest and put it right. The remainder of the acquisition price that has not been covered off by bank debt needs to be filled by equity. A danger of having too much equity in a company, however, is that returns will be lower.

A challenge for these new entrants is to get this balance right as equity providers have requirement for returns in the order of between 25% and 30% or more. Mezzanine finance was presented as a possible solution to this problem and we may see this form of capital becoming more common in the North Sea (reflecting its popularity in the Gulf of Mexico). The benefit of mezzanine capital, which is essentially a hybrid between pure debt and pure equity, is that it helps increase the leverage of the company and is fully flexible. It can provide efficiency to the capital structure, which enables projects to proceed.

Stemming production decline

The present business model for the North Sea was criticised as being too costly and inefficient if the industry was to achieve the goal of stemming the decline in production.

The change from the current joint venture structure to one where there is more involvement of the small companies as low-cost operators with innovative and proactive agendas is being encouraged by the UK Government. A presentation by the UK Department of Trade and Industry (DTI) demonstrated the commitment that government is placing on supporting this sector. However, the growth of this new industry and the benefits that will follow is dependent on the increase in the number of assets coming to market.

A presentation from Shell gave encouragement that more non-core assets, which clutter the balance sheet of the majors, will be available. Unfortunately, the drive for production increases and reserve replacement determined by internal targets does not encourage asset sales unless there are other, better opportunities to invest in and which can attain such goals. It is important that this vibrant new sector is ready for when, as seems inevitable, assets become available for acquisition in significant numbers.

Emerging community

The number of attendees at the conference, which exceeded 160, and the level of interest shown demonstrates that there is a real community evolving around the emerging independents. This is an exciting time for entrepreneurial teams to break the mould and realise benefits for themselves, their investors and the UK oil and gas industry.

Significant challenges exist to be overcome. Specifically, access to infrastructure on a competitive basis, the acquisition and development of proven undeveloped assets before decommissioning puts them out of reach, the ability to handle the abandonment risk, the ability of small teams to handle large problems and the ability to balance the capital structure and provide the right risk-reward ratio appear to be the main issues.

Nevertheless, the North Sea provides a unique opportunity where there is an extensive depth of knowledge and the infrastructure and systems are in place to exploit the upside for the innovative and nimble start-up. It would seem the only obstacle in the way to achieving the goal of this sector is our own prejudice, attitude and behaviour.

Getting it right

Internet technologies promise to lead the way in technical advances within the oil and gas industry in the future. *Sean Kalkwarf*, CEO of Sourcetec.net – an Internet technology company specialising in bespoke product development and integration for a range of industry sectors – offers his views on the past, present and future impact of the Internet on the oil and gas industry.

The use of Internet technology can be the best thing that ever happened to your business. It can also prove to be expensive, inefficient and irrelevant. This is not the fault of the technology; it's how the technology has been applied that causes problems.

To illustrate this fact, let's take a look at recent history. After the unveiling of the first user-friendly browser in 1993, the Internet became commercially viable. PCs now had access to graphics and text at a reasonable speed. Usage grew significantly between 1993 and 1996 but business minds still viewed the Net as the preserve of academics, scientists and programmers. Then, with the huge increase in PC users with Internet access, the attitude changed. There was a dramatic explosion of interest in the Net and the potential business opportunities to be derived from its use. A frenzy ensued and expectations of immediate and stratospheric returns were commonplace. In reality all this was a hugely successful oversell on expectation.

Expectation oversell

Oil industry trading platforms have become a prime example of this oversell. Suppliers have been understandably reluctant to abandon traditional business practices with established customers and move towards multiple exchange memberships with high integration cost implications and uncertain benefits. As respected oil industry consultant Norman Smith put it: '...the recent obsession with multi-membership trading exchanges may prove to be something of a blind alley; many suppliers, probably rightly, see the prospective advantages too skewed in favour of "Big Oil" to generate much enthusiasm on their part.'

Although public exchanges are expected to consolidate over time, we at Sourcetec believe that private exchanges will gather momentum. This belief is echoed by Graham Sadd, founder President of the software company Izodia, which provides the exchange infrastructure, who said: '...the industry focus has now moved firmly to private exchanges, single company focused applications that ultimately aim to automate their entire supply and demand chain using the Internet for connectivity.'

Public or private exchanges relating to the Internet need to resemble current business practices and methods, bringing 'human interaction' into trading platforms to provide the same 'trust with a face' factor into Internet transactions that 128-bit encryption will never supply.

Ideally the main procurers will assist their supply chain to enter the private exchange by making use of XML (extensible markup language) to allow the companies' systems to talk to one another. As more and more companies become Internet literate in a universal language, trading will be more effective and administrative savings will be a reality, while the advantages of the traditional supplier/client relationship will remain in place.

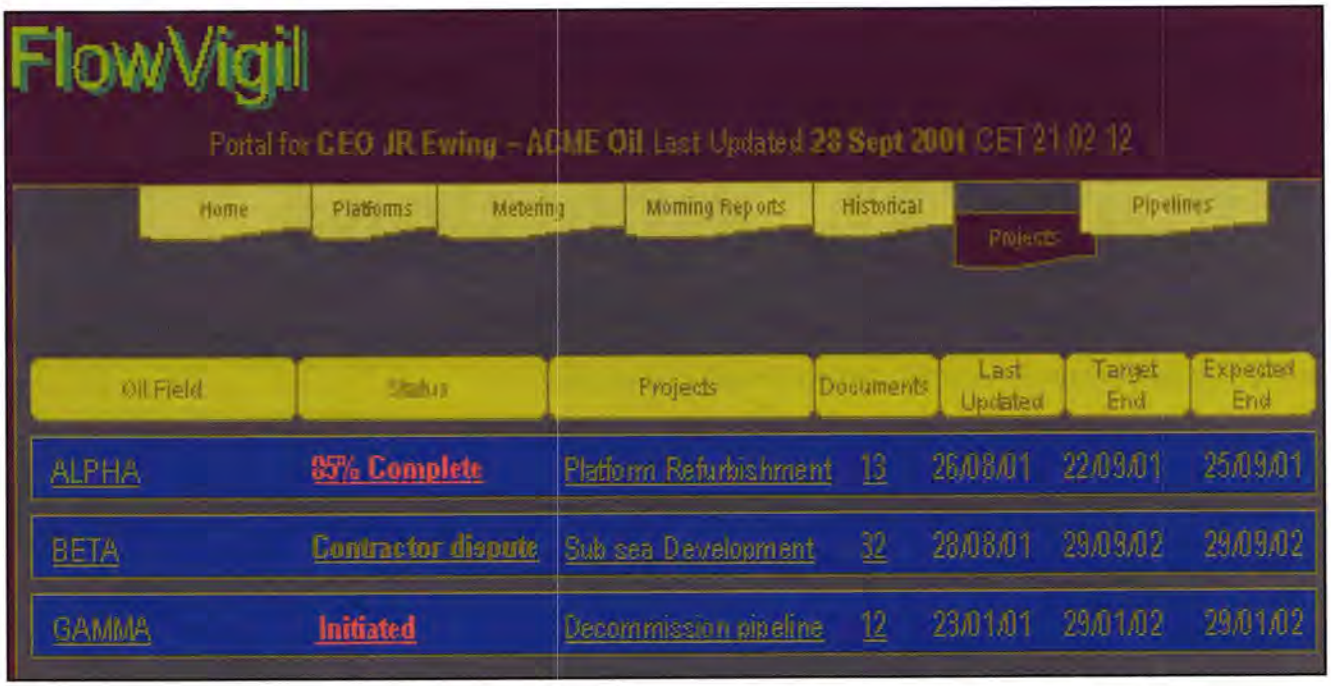
Impact on operations

Many areas in the operational side of the oil and gas business have already been affected by Internet technology. Real-time monitoring and control of new and existing systems will increasingly form a significant part of the Internet's contribution to the industry, allowing monitoring and control systems to be operated by personnel located anywhere in the world. As Norman Smith notes: 'The oil and gas companies' long-standing pre-occupation with reducing their purchase costs may well have led them to misunderstand where the main benefit from Internet technology will be delivered to them. This increasingly looks to be in the operational area.'

Products and services that offer browser-based project management, communication, real-time flow assurance monitoring, real-time telemetry and remote control of hardware are enjoying widespread interest. As more functionality of the Internet is directed towards mundane day-to-day processes – reducing the cost of simple things such as software rollouts, maintenance, travel and bandwidth use – real cost savings will follow as a result of streamlining and increased productivity.

Words of warning

However, companies need to be aware that the accelerating adoption of intranet, extranet and web-based applications within the industry brings complications. Even if bandwidth is increased, it will still be at a premium. This means that any application running over a network, which is bandwidth hungry, will need to be transformed into a bandwidth-friendly format provided by Internet technology.



Another danger is the proliferation of applications needed to perform functions. It is my understanding that many industry professionals now need to work with up to 30 or 40 applications in the normal course of their work. Unfortunately, this trend is set to continue, especially when you consider the technological advances being made within the industry.

However these applications are utilised, whether from the Net or via hardware in the field, they will be providing data which should be analysed by a professional. This situation is currently leading to a data rich, information poor environment. This is a complicated problem to address because it is not possible to just remove the offending applications. At some point the data they provide is vital and has to be accessible at all times in a format that can be cross-referenced.

Yet this is a problem that can be solved. Taking the telecom industry as an example – when such a company implements a network it installs unique flavours of specialist software with which it manages its network. Each piece of software performs a different task, is complicated to manage, and extremely expensive – producing a unique stream of real-time data to be monitored and assessed. To manage this quantity of data, telecom companies have started to implement inexpensive universal interfaces. This allows anyone with the correct security clearance to access data directly from their OSS (operational support system) and view it in a dashboard format designed around their professional requirements. Thus, the professional within the telecom company can pinpoint all the relevant information, as well as all the additional information, which relates to the data they wish to see. They can access any data produced by the OSS but, due to the structuring of the interface, they will only view useful data.

Universal interfaces can be constructed to contain a range of powerful functions, including alarms and alerts so that the user can set and be informed of significant changes in their project or management domain. For examples of this kind of technology visit **www.vigilize.com** – claimed to be today's universal interface market leader in this sector.

Universal interfaces

The oil industry is already implementing universal interfaces. Our work with Hanover Measurement Services is a good example as the company is to soon provide real-time data collection, production control, monitoring and reporting via the Internet. This allows producers, processors, gatherers, marketers and pipeline companies to remotely manage multiple fields, compressor sites and measurement stations from any geographic location.

Through a single interface, Hanover Measurement Services also provides flexible and precise management of historical measurement data, including flow computer data processing, chart integration, gas calculation, physical gas balancing, chart tracking, data storage and reporting. The demand for the clarity and flexibility such systems offer to professionals within the industry should provide the impetus for widespread uptake of Internet-based management systems.

Looking ahead

Future projects will include transmitting and integrating information generated by hardware-based monitoring devices such as sand monitoring. Once stored within a database the information can be reviewed in real time through any browser connected to a secure Internet connection. This will enable the system user to monitor the amount of sand, water, and oil that is being pumped from an individual well. The benefits will include man-hour and transportation cost savings as the need for regular well inspections is removed. Content problems, such as pumping too much sand or water, can be remotely acted upon.

This is the direction the oil and gas industry is heading. Whatever the requirements of a particular company, all the information will be easy to access through a single interface.

To conclude, e-technology has almost learnt its lesson – expectations are more realistic. Whatever you think about the Internet, the technology is very powerful and will change the face of the industry – but not as fast as some people have predicted. Approach Internet technology as you would any other technology – demand scaleability and flexibility and look out for data overload.

Understand the main technological advantage – low bandwidth cost, and its downside. It doesn't come with a viable business model in the box.

For further information, contact Charlie Dutton at **Sourcetec.net** *on Tel: +44 (0)20 7692 9204; e:* **charlie.dutton@sourcetec.net**

On the road to cutting future CO_2 emissions

The world's automotive industry is already planning for ever tighter environmental controls despite America's reluctance to sign up to the Kyoto Protocol. Hybrid electric vehicles (HEVs) are expected to increasingly take over from today's vehicle designs and to pave the way for fuel cell power. *Gibb Grace* reports.

In contrast to the US, Europe seems to truly believe in the need to make the Kyoto Protocol work. Indeed, it is central to much of Europe's legislative planning. ACEA (the European association of vehicle manufacturers), for example, in agreement with the EU, plans to cut carbon dioxide (CO_2) emissions produced by new cars by 25% over the period 1995–2008. The Association established a weighted average baseline figure of 186 grammes of CO_2 per km in 1995, improving it to 174 g/km by 1999. It now reports that it is on course to meet its target of 140 g/km by 2008 and deliver the promised 25% reduction.

As commendable as this improvement is, it is based largely on the switch – on the Continent as least – from petrol engines to advanced, direct injection diesels. And come 2008, if the improvement is to continue, even more efficient technology will be needed, that will be capable of pushing the new car fleet average below 100 g/km.

The internal combustion engine has served us well, but continuing concerns over global warming and exhaust emissions will increasingly count against it this decade. Fuel cells hold out the promise of truly clean vehicles, but opinion is still divided as to the most effective way of providing the hydrogen fuel they need to run on. Pure hydrogen is the ideal, but it is expensive and would need an even more expensive retail infrastructure to supply it. Hydrogen can be derived from methanol carried onboard the vehicle, but methanol is not ideal as it is corrosive to many commonly used materials and unprotected skin. Hydrogen can also be derived from petrol, and while this is attractive from the infrastructure point of view, designing a compact, onboard system to extract it is far from easy.

Sometime in the next decade, the car industry could be facing a watershed. Petrol and diesel engines will have reached their developmental limit, while fuel cell technology will be, relatively speaking, still in its infancy. Assuming environmental pressure is at least maintained, the automotive industry will need an interim product that delivers even better fuel consumption, has an improved emissions performance, and ideally uses proven, low-cost technology.

Bridging the technology gap

For cars, light commercial vehicles and city buses, that gap is looking increasingly as though it will be filled by hybrid electric vehicles (HEVs). Such vehicles are likely to use advanced petrol and diesel engines to power the vehicle and/or charge a battery pack that can in turn, power an electric motor. Clever electronics will determine the ratio of engine to battery power, and the use of an asynchronous electric motor will mean that during hill descents or braking, the vehicle's kinetic energy can be used to recharge the battery pack.

HEVs may sound like an unlikely mix of mechanical and electrical technologies but, in fact, the first hybrids are already in production in the shape of the Toyota Prius and the Honda Insight cars. Both cars are claimed to reduce emissions of hydrocarbons (HC), carbon monoxide (CO) and nitrous oxides (NO_x) to around 10% of the strict Japanese emissions requirement and are said to be capable of breaking the 100 g/km CO_2 barrier.

Interest in HEVs is also growing in the city bus and delivery truck sectors too, where the search for the reduction of noise pollution and exhaust emissions is becoming increasingly important. Allison Transmissions has spent the last eight years developing its ES electric drive, which is aimed at both the bus and truck markets. The company has demonstrated a city bus that uses a 250 hp diesel to drive an electrical generator. Electricity is stored in a roof-mounted battery pack and this, in turn, powers an electric motor that drives the rear wheels.

Rethinking electrical systems

The traditional divide between conventional internal combustion engines and pure electric vehicles will become increasingly blurred in the not too distant future, and engineers are having to rethink vehicle electrical systems. Bosch has already developed a dual voltage electrical system based around 14 and 42 volts. The alternator supplies high demand components such as the starter directly with 42 volts, while low demand components such as lamps and radios are supplied with 14 volts via a dc/dc converter.

Next generation vehicles will demand more electrical power and Bosch engineers are also rethinking the traditional alternator. They have come up with a single electrical machine that combines the functions of the alternator and the starter motor. This integrated starter-generator (ISG) is based around an asynchronous motor that can perform both roles. It not only uses electrical power to start the engine but, during braking, it converts the vehicle's kinetic energy back into electrical energy which is used or stored by the vehicle system. Bosch is looking at a number of alternatives as to how such a system could be integrated into the driveline. By far the neatest solution is an asynchronous machine located between the engine and the transmission, where the rotor also acts as a flywheel.

French truck manufacturer, Renault V I is also evaluating a combined starter-alternator unit on a heavy truck which, it claims, can reduce fuel use and thus exhaust emissions by up to 10% in urban operations. The unit is the result of a three-year

development programme carried out in collaboration with Continental ISAD (integrated starter alternator damper). The system which is said to add about 30 kg to the vehicle's unladen weight, replaces the traditional starter motor, alternator and battery pack with an asynchronous electric motor/generator and adds a new 42 volt battery pack.

Stop–go function

The system has a number of advantages over conventional solutions, but the most notable is its 'stop–go' functionality. In operation, whenever the vehicle stops in traffic the engine is automatically shut down, thereby eliminating unnecessary pollution and saving fuel. It starts again automatically when the throttle is depressed. The asynchronous motor is electronically controlled and can bring the truck's 6.2 litre diesel engine up to idling speed within 0.2 second. Importantly too, in an urban situation the shut-down and start-up operations are silent and virtually vibration free.

Operating as an alternator, the system produces between 6.5 kW and 35 kW of electrical power, 80% of which is produced while the engine is running in its normal operating range. This novel system with its high electrical power potential opens up many new possibilities, such as instantaneous cab heating and fast windscreen demisting. Electrical power could be used in place of mechanical drives to run compressors for climate control and air conditioning systems, and it would even be possible to use normal 220 volt household appliances such as TVs, coffee makers, microwave ovens and so on. But the designers' main aim is to provide a mature, silent, wear-free, stop–go system that will operate throughout the vehicle's life and reduce fuel consumption and emissions.

Ford America has announced that it will introduce an ISG in its Maverick HEV in 2003, similar to that shown in its P2000 HEV concept car. Soon after its introduction in the Maverick HEV, ISG will be available in a new generation Explorer where it will provide a stop–go capability. Ford says the driver will not notice the transition from stop to start and that ISG will help Explorer achieve 'unprecedented' fuel economy.

To support the ISG system, Explorer will also use a 14/42 dual voltage electrical system. Under braking the ISG will generate electricity and direct it to the 42 volt traction battery which can be used to provide a useful acceleration boost to the V6 petrol engine whilst pulling away from rest. A smaller 12 volt battery will be retained to power standby items such as hazard warning indicators, lights and the audio system, and to save the cost of redesigning the onboard electronic systems.

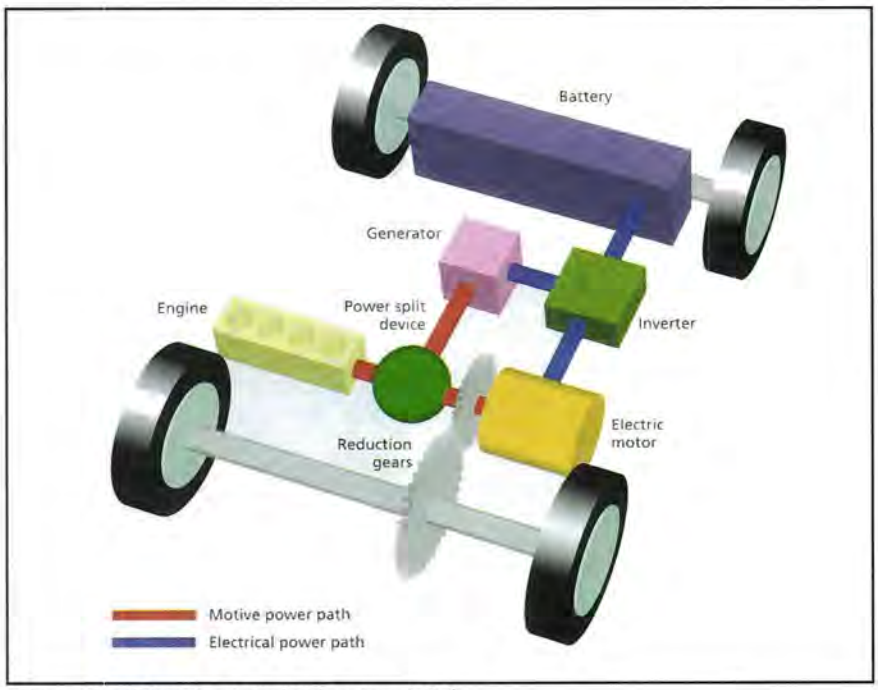
The first hybrids are already in production – the Toyota Prius

Ford says that apart from these obvious benefits, ISG will support 110 volt ac proprietary equipment and tools and pave the way for other future technologies. These could include energy efficient devices such as electromechanical valve train actuation, electrically driven superchargers, and active suspension systems.

Painless transition

HEVs offer many new possibilities and there seems little doubt that they will ease the transition from today's mechanical engines to tomorrow's chemical/electrical fuel cell power. As Toyota and Honda have shown, HEVs are already very clean and fuel efficient by today's standards, and they will undoubtedly improve further still as the technology matures.

Nonetheless, the HEV technology is essentially evolutionary rather than revolutionary – something that is seen as a definite plus by the car manufacturers. Thanks to HEV technology, the next decade's cars will still have internal combustion engines, will still run on petrol or diesel, and importantly, will still be large enough to transport the family in comfort. Salesmen need not worry about having to sell tiny, cramped cars with below average crash protection or, indeed, hugely expensive cars relying on space technology. Even fuel retailers need not worry unduly, for although HEVs may eventually use half the fuel of today's cars, an ever increasing vehicle parc and increased car usage is bound to offset much of the fuel saving promised by HEV technology.



Schematic of the Toyota hybrid system (THS)

Vapour containment on road tankers

In recent years there has been increasing emphasis on environmental performance in the petroleum distribution industry, which is now addressed by European and national legislation. Emissions of volatile organic compounds (VOCs) resulting from the storage of petrol and its distribution from terminals to service stations (including by road tanker) are now controlled by European Directive 94/63/EC. *Robert Harris*, Transport Engineer, Shell UK Oil Products Ltd and *Martin Hunnybun*, Technical Manager Distribution and Aviation, Institute of Petroleum (IP), report.

In the UK the provisions of the Directive are implemented through regulations under the Environmental Protection Act (EPA). However, the requirements under the Directive for the design and testing of road tankers are included in HSE Approved Tank Requirements under the Carriage of Dangerous Goods by Road Regulations.

The Approved Tank Requirements apply to all road tankers that carry petrol and were first constructed or converted to bottom loading after 31 August 1996. There are three particular requirements applicable to a tanker:

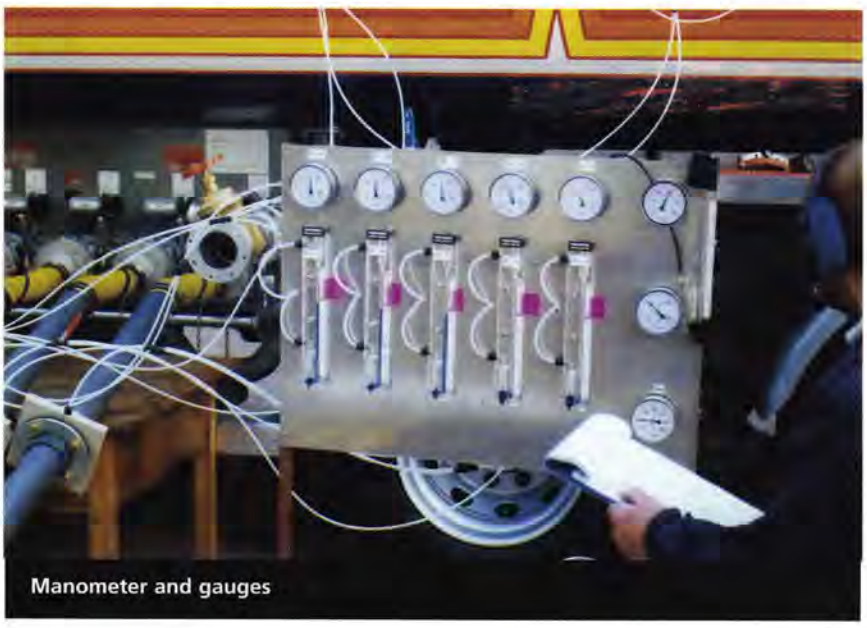
- A corrosion-resistant plate shall be affixed, marked with the maximum number of compartments that can be loaded simultaneously, each at a flow rate of 2,500 litres per minute, without causing vapour to be released through any of the pressure and vacuum breather vents (Clause 31).
- Pressure and vacuum breather vents shall be tested at intervals not exceeding 24 months to ensure that they are leak tight in any orientation and that their actual opening pressures are within the specified tolerance of their nominal set pressure (Clause 34).
- The tank and its fittings shall be subject to a leakproofness (vapour tightness) test at intervals not exceeding three years (Clause 35).

Clause compliance

The IP's Road Tanker Panel technical committee is concerned with the conveyance of petrol from distribution terminals through to retail sites by road tankers, and brings together key engineering experts from across the petroleum road tanker business. The Panel contributed to the technical input made by the IP to the UK implementation of the VOC Directive, and at an early stage recognised the benefits to industry of providing validated test protocols to show compliance with Clauses 31 and 35 of the Approved Tank Requirements. It soon became apparent that the proving of leak tightness of conventional designs of pressure and vacuum breather vents in any orientation, which is part of the requirement of Clause 34, was not seen as a practical in-service test for which a protocol could be developed.

Work began on drafting a new IP technical publication – 'Testing of Vapour Containment on Petroleum Road Tankers' – and it was agreed that it should be divided into two parts, to address Clauses 31 and 35. The first stage was to provide a test procedure for determining the maximum number of tanker compartments that can be loaded simultaneously without vapour being released through the pressure and vacuum breather vents.

The protocol developed describes a flow test using air to simulate the passage of petrol vapour through the



Manometer and gauges

pipework and service equipment on a road tanker. In order to take account of the differences in the physical properties of petrol vapour and air, a conversion factor of 1.7 times the volume (and flow rate) of petrol vapour is employed to determine the flow rate of air to be used. The test replicates the recovery of petrol vapour from a road tanker during loading by blowing air into its compartments through the filling valves under controlled conditions, and regulating the air flow rates and measuring pressures developed within the road tanker barrel.

Trial run

The procedure was validated by undertaking a series of trials under controlled conditions on a service tank certified clean and vapour tight. The trials proved that the test method was a satisfactory, robust and repeatable process and gave results in line with predictions. The IP thanks Emco Wheaton UK Ltd and also The Drum Engineering Company Ltd (now Syltone UK Ltd) for their work in conducting the trials.

The Panel also considered the use of a calculation method, being considered by CEN/TC 296/WG 7, to show conformance with Clause 31. However, as this method has yet to be validated, it is recommended that it should only be used for assessing variations from a standard tank design that has been approved by physical test.

The second part of the technical publication provides a test protocol to determine the leakproofness of a tanker. The protocol developed describes a procedure using either low pressure air from a high flow rate, low pressure blower (compressor), or a typical proprietary tank testing system using regulated high pressure nitrogen. The protocol recognises that other methods that achieve the same results may also be suitable. Again, successful trials were carried out to validate the protocol using the different test equipment.

During the final stages of drafting, technical comments were solicited from the Health & Safety Executive, and the Panel wishes to acknowledge the contribution made by the Executive, coordinated through Ken Woodward of the Gas and Process Chemical Safety Unit.

Safe common standards

Testing of Vapour Containment on Petroleum Road Tankers was published in April this year and it is expected that certification of tankers, confirmed by testing in accordance with the protocols in this publication, is likely to be required by the Safe Loading Pass Scheme operated in the UK by the major oil companies with effect from 1 January 2002. In preparing this publication, the Panel was aware that not all road tankers are now maintained in dedicated industry workshops and that the procedures described should enable the adoption of common standards for testing road tankers both at manufacture and throughout service.

This latest technical guidance demonstrates the important role that the IP plays in providing industry with a practical means of showing compliance with regulation. Although written specifically to address UK regulatory requirements, the methodology is applicable in many regions around the world.

For details of the other IP technical publications applicable to road tanker and road tanker equipment design, manufacture, maintenance and operation you can visit the IP website at **www.petroleum.co.uk**, *or contact Martin Hunnybun, Tel: +44 (0)20 7467 7133; e:***mh@petroleum.co.uk**

CRINE contracts

New standards set offshore

A new model contract and sub-contract specifically targetted at small and medium-sized enterprises (SMEs) have been added to CRINE's suite of nine standard contracts.

The new CRINE standard contracts for SMEs acknowledge the integral and essential part these companies play in the success of the oil industry, according to Stuart MacBride, Member of the CRINE Standard Contracts Committe and Chairman of private offshore catering company Trinity International Services. 'They also recognise that the pressures on SMEs are different from those experienced by larger companies. While the model clauses they contain may be lengthy by comparison with the usual service orders issued to SMEs, they are comprehensive and set out all the risks and obligations of the parties. All too often these are left unspoken and the SME signs the service order hoping for the best in the event of a problem.'

The original concept for the CRINE contracts, which now come under the auspices of LOGIC (Leading Oil & Gas Industry Competitiveness), was to develop a range of documents that would outline standard 'terms and conditions' for different types of contract work undertaken in the offshore oil and gas industry. The model contracts would provide common ground from which client and contractor could develop their negotiations and construct the finer points of the deal.

Offshore activities covered by the orginal suite of standard contracts include construction, design, offshore and onshore services, mobile drilling rigs, marine construction, supply of major items of plant and equipment, as well as purchase order terms and conditions.

A further document, one for well services work and the subject of much past comment, has been revised in partnership with the Well Services Contractors Association and has been relaunched to coincide with the release of the new SME contracts. It is intended that eventually all of the original CRINE contracts will be reviewed and, where appropriate, re-issued.

According to Clive Fowler of BP and Chairman of LOGIC the impact of the standard contracts 'has been to reduce time – and costs – involved in reviewing every new contract document received and in consulting back and forth between client, contractor and legal advisors. That time was wasted and may now be used for more beneficial purposes.'

Copies of the CRINE standard contracts, published by the Institute of Petroleum, are available from Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester C02 8HP, UK. Tel: +44 (0)1206 796351; Fax: +44 (0)1206 799331; e: **sales@portlandpress.com**

Environmentally sound coating

A new environmentally friendly, water-borne fastener coating from Whitford Plastics has, according to the manufacturer, demonstrated 'outstanding' corrosion resistance when compared with traditional solvent-based coatings.

Stringent salt fog tests carried out to ASTM-B117 specifications show that Xylan 1424 is three times more resistant to red rust corrosion, compared with solvent-based coatings.

Xylan 1424 has been developed for the offshore sector. It is a resin-bonded, thermally cured, single film dry lubricant and designed for spray application. It is also 'chip-resistant.'

In Whitford's comparative tests – in which two individual coats of Xylan were applied over a grit-blasted and phosphate treated pre-treated surface – the solvent-based coating developed light-to-medium rust after 800 hours, whereas Xylan apparently showed no change after the same length of time. Over 1,200 hours, the solvent-based coating developed more than 15% rust, while Xylan had less that 5% red rust spots. In extended trials Xylan reached 15% rust after 4,000 hours' exposure.

Xylan is available in a wide range of colours and can be applied to all types of fasteners in a broad range of materials, including aluminium, brass, high alloy steels, carbon steel, titanium and zinc plating. Its corrosion inhibiting qualities can also be enhanced when applied in conjunction with a further range of primers and pre-treatments, according to the manufacturer.

The coating is designed to withstand most solvents, automotive fluids and fuels and is said to be impervious to the new water-based hydraulic fluids recently introduced into the offshore industry.

Other features of Xylan include: low-flash-off temperature – air dry or force dry at 100°C, low cure temperatures of 205°C and suitability for use with a wide rage of substrates.

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Drill software

Advantica and Technical Toolboxes have launched the Drillstring Dynamics Calculator (DDC) – a software package that enables users to extend the working life of the drill stem by predicting the rotary drilling speeds that cause resonance.

DCC was developed by Advantica from the results of extensive research into the dynamic behaviour of drill stems. The objective is to prevent failures before they occur by extending the life of the drill stem so that total depth can be reached without a 'washout' or 'twist-off.'

The DCC software can be applied both onshore and offshore and works by analysing the drillstring in sections of the well from the surface to total depth, showing the vibration against drilling speed. Graphical representations of the drillstring vibration enable DCC to produce easy to interpret results which will immediately show where problematic vibrations are occurring.

The multi-functional tool also provides: low ROP and bit life; failure investigation, MWD tool protection, shock sub placement; dynamic MWD data interpretation and hole problems.

According to Advantica: 'Drilling engineers should use DDC in the early stages of planning a well... that way, problems can be anticipated and prevented.'

Tel: +44 (0)1509 282525
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Miniature valves slash space and weight restrictions

Parker Hannifin has launched a new range of miniature stainless steel needle valves and manifolds for fluid instrumentation applications.

The range operates at up to 414 bar and offers bubble-tight sealing with life-cycles of over 6,000 operations, yet, according to the manufacturer, reduces weight and space requirements by 50% compared with conventional products.

The High Performance Miniature Range includes 2- and 3-way manifolds for pressure and flow measurement applications and a needle valve range which can be specified in global or angled flow patterns.

The needle valves are available with a user-specified choice of female or male interfaces and can be provided with additional single- or double-ferrule CPI or A-LOK compression tube connections. These latter options are said to halve potential leak paths and assembly labour requirements compared with conventional pipe threaded connections.

Valves are fitted with Viton 'O' ring seals, supporting an operating temperature range up to 204°C. This sealing system is designed for high integrity, and features an anti-extrusion back-up ring, plus an anti-blowout design with back seating which is reported to minimise atmospheric leakage in the event of stem seal failure.

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NEWS Technology

Improved guided wave radar technology

The benefits of guided wave radar (GWR) level measurement technology are said to have been extended to a wider range of applications following the recent introduction of the single rigid rod and single flexible probe options to the Eclipse range of GWR level transmitters.

The Eclipse 708 model, available from Magnetrol International, is a single rigid rod probe option which means effective guided wave level measurement is possible on tough applications where coating media and viscous liquids are present. The model can also be supplied with a flexible probe option from one metre up to 15 metres, so it can be used in a number of different applications where longer length and/or minimal headroom is a problem.

The Eclipse guided wave radar level measurement principle provides accurate level measurement, regardless of the presence of process variables which render other level measurement technologies ineffective, states the company. These variables include changes in specific gravity, dielectric, conductivity, vapours and foam. In addition, with Eclipse, no level movement is necessary for configuration or set up. The system has no moving parts and has CENELEC, Exd and Exi safety approval.

The addition of these new probes extends the Eclipse range that includes options for applications such as high temperatures and high pressures – 135 bar at 400°C and 345 bar at 20°C – along with a special propane version for level measurement of aromatic hydrocarbons, propylene, butadiene or other medias with dielectric values as low as 1.4.

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Torsion-free bolt tensioning

Hytorc has launched a new three-piece nut/bolt replacement called Hytorc-Clamp. It has the same dimensions as the nut or bolt that it replaces but its inner sleeve is spline-connected with a washer, making it subject to greater turning friction than the outer sleeve attached to it.

A hydraulic tool is deployed to divert the reaction force to the part with the greater turning friction and the action force to the one with the lower turning friction. The outer sleeve starts turning, pulling up the inner sleeve (to a pre-calibrated tension) and thus the nut or bolt – but torsion and side-load free. As the turning takes place on surfaces precision-machined in the manufacturing process, the coefficient of friction is known to a load accuracy of ±3% with the customer's desired lubricant. The speed of operations is increased and there is an increase in efficiency from this retrofit upgrade, according to the manufacturer.

The clamps can be used to up to 535°C. No reaction point is required because the tool reacts against the clamp so it can be used in very limited access situations and operated hands-free, remotely or upside down.

Industries that could benefit from the clamp include offshore and onshore oil and gas operations, hydrocarbon and chemical processing and power generation.

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Web management solution

CGG has recently launched WebVista, a web-based tracking and reporting system. The system gives authorised clients real-time access to all relevant information concerning their data processing or reservoir project via a web-browser. A shared secure access enables the necessary dynamic exchange of information through an intuitive interface. WebVista, according to the company, 'provides the solution for integrated project management between clients and project teams.'

WebVista allows clients involved in the same project to access all project data in a common fashion, whenever they wish, from virtually anywhere in the world. In this way, the multi-disciplinary skills required at each stage of such a project can be easily mobilised to investigate all project dimensions.

WebVista clarifies and accelerates decision making through improved communication, states CGG. It highlights priorities at each stage, provides real-time project status and allows the project team to focus on key issues. It is said to reduce the number of meetings that need to be held throughout the life of the project and helps to better focus the agendas of the meetings that do take place. The decision making process is accelerated online at the meetings, leading to reduced project turnaround time. Also, with faster and better communications, clients are more closely associated with their projects. Project plans updates are instantly available for client validation and comment to achieve consensus.

The project tracking and database system is hosted in CGG's website in a protected area, guaranteeing asset security. All project relevant information is collated, catalogued and classified into the system, simplifying and speeding up document access and retrieval through the use of hyperlinks.

WebVista, according to CGG, is a 'value solution that enables oil companies to better react to moving priorities.'

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Membership News

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Mr K Tyrer, Glasdon UK Limited
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Mr K Virji, Finwell Limited
Mr S West, Kroll Lindquist Avey
Mr S Wheeler, Solartron Mobrey
Mr M Wojcik, Switzerland

STUDENTS

Mr C Kratz, London
Mr A Mammadou, London
Ms S A Nelson, University of Aberdeen

STUDENT PRIZEWINNERS

Mr N A Lorenz, Aberdeen
Mr M Piri, Imperial College

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e: sales@modularcardsystems.com **www.modularcardsystems.com**
Representative: Mr Pete Fisher, Sales Manager
Modular Card Systems develops, manufactures and markets electronic equipment. Products include fuel management systems for both resale and private fleet applications. The company also manufactures attended and unattended terminals including access control systems. Where applicable, all master bunker fuel and credit/debit cards can be accepted.

IP THE INSTITUTE OF PETROLEUM

Training Courses 2001

INTRODUCTORY COURSES

The Institute of Petroleum is widely acknowledged as the leading provider of introductory courses on the operations and economics of the oil and gas industry. The courses are particularly valuable for:

- Those who require an informed introduction to the economic and commercial background and general trends of the oil industry.
- Those new to the industry, including graduate trainees, who require a concise introduction to the industry.
- Those already working in the industry requiring a broader perspective of the oil and gas industry's and their economic development.

20 - 22 June 2001
London

INTRODUCTION TO OIL INDUSTRY OPERATIONS

This well-established course provides a concise and informed introduction to operations, from the search for oil and gas to the delivery of products to different customers. Participants will gain an appreciation of the principal activities in the international upstream and downstream petroleum industry and an understanding of how these inter-relate, as well as an awareness of the impact of external influences and the ways in which the industry is adapting to increase its competitiveness and to meet new challenges. This intensive, three-day course will cover:

- Changing Perspectives in the International Oil Industry
- Exploration for Oil and Gas
- Basic Concepts of Drilling
- Petroleum Production
- Field Development
- Crude Oil and Characteristics of Supply
- Oil Trading and Supply Operations
- Marine Transportation
- Basic Processes of Refining
- Refinery Optimisation
- Logistics and Distribution
- Marketing
- Retail Marketing
- Natural Gas
- Environment

25 - 27 June 2001
London

INTRODUCTION TO PETROLEUM ECONOMICS

This course concentrates on the structure of the oil industry, the geopolitics of oil and the workings of the principal markets. It provides an informed introduction to the economic and commercial background and general trends of the oil industry, underpinning an understanding of oil and its markets, with an awareness of global and strategic issues. It is presented by a team of lecturers all of whom have considerable experience of the oil and gas industry and are practised in teaching and lecturing on these subjects. This intensive, three-day course will cover:

The Economic Structure of the Oil Industry

- An Overview of Petroleum Economics
- The Economics of Exploration
- Upstream Economics
- Downstream Economics

The Geopolitics of Oil

- OPEC and the Middle East
- Eastern Europe and the Former Soviet Union
- Asia
- The Americas
- North Sea Basin

The Oil Markets

- Crude Oil Markets
- Product Markets
- Oil Futures Market
- Oil Supply and Price
- The Outlook

For more information please contact: Nick Wilkinson at The Institute of Petroleum
Tel: + 44 (0) 20 7467 7151 Fax: + 44 (0) 20 7255 1472
E-mail: nwilkinson@petroleum.co.uk www.petroleum.co.uk/training

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NEW Publications

E-Commerce in the Oil and Gas Industry*

(FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISDN 1 84083 403 X. 133 pages. Price: £445.

Goldman Sachs projects that global B2B e-commerce will soar to $4.5tn in gross revenues by 2005, with oil and gas in the US alone making up to $171bn. But what will happen in the meantime and how can global energy companies use e-commerce to protect their interests, cut costs and perhaps create new business models? What sort of strategies should companies, both large and small, adopt to stay competitive? Who is taking equity stakes in dotcoms and who is developing their own? These are just a few of the questions that are addressed in the report. There is in-depth analysis from leading experts and advice on such topics as strategies for building an Internet presence, integrated procurement systems, e-business applications for upstream oil and gas, and selling commodity and complex products online.

Containerisation International Yearbook 2001*

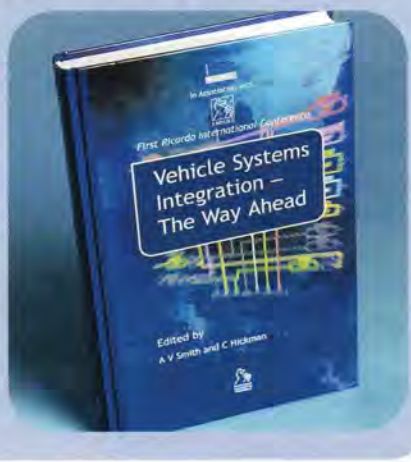
(Informa Business Publishing, 69–77 Paul Street, London EC2A 4LQ, UK). ISDN 1 85978 985 4. 784 pages. Price: £260.

This guide is valuable to anyone involved with any aspect of container shipping. It contains industry reviews from leading experts – covering areas such as changes in container shipping over the past year and port and vessel rankings. There are also over 1,400 container industry website addresses; port and terminals listings; port industries associations; all-water carriers; an index to trade routes; operators on principal trade routes; liner operators, alliances and consortia; freight forwarding; tank container operators; rail and road haulage associations; an equipment guide and information on container/swopbodies.

Vehicle Systems Integration – The Way Ahead*

Edited by: A V Smith and C Hickman (Professional Engineer Publishing, Northgate Avenue, Bury St Edmunds, Suffolk IP32 6BW, UK). ISBN 1 86058 262 1. 327 pages. Price: £152.

This publication comprises all the papers presented at Ricardo's International Conference held in Brighton in June 2000. It focuses on the new technologies and systems engineering challenges facing powertrain design and development over the coming decade. Some of the most advanced research and application work in the field is contributed by senior representatives of industry and academia. Topics examined include: engines and after-treatment; control systems – development and calibration; powertrain systems integration for performance and economy; and integrated powertrain systems – modelling and control. The book is suitable for senior engineers, managers and directors who are involved in the specification, design, development and systems engineering of new powertrain and related vehicle products.



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Latest from the Library

YOUR OFFICE AWAY FROM HOME

IP Members are welcome to suggest additions to library stock. Please e-mail or write to Catherine Cosgrove giving as many details about the publication as possible, and quoting your IP Membership Number.

Some New Editions to Library Stock

- *1997 Energy Statistics Yearbook*. United Nations Department for Economic and Social Information and Policy Analysis, New York, 2000.
- *2000–2001 Infrastructure Finance: Project Finance, Utilities and Concessions*. McGraw-Hill, New York, 2000.
- *Motor Fuel Markets: Prices and Taxes: Annual Review 2001*. By D Louden, HyperActiv Group, Lancashire, 2000.
- *World LNG Map*. Petroleum Economist, London, 2001.
- *The Chemical Tanker Register 2001*. Clarkson Research Studies, UK, 2001.
- *Geology and Warfare: Examples of Influence of Terrain and Geologists on Military Operations*. The Geological Society, UK, 2000.
- *Industrial Cleaning Technology*. Kluwer Academic Publishers, The Netherlands, 2001.
- *Human Rights and the Oil Industry*. Intersentia, The Netherlands, 2000.

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Contact Details

- Information queries to:
  Chris Baker, Senior Information Officer, +44 (0)20 7467 7114
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- LIS management queries to:
  Catherine Cosgrove, Head of LIS, +44 (0)20 7467 7111
- IFEG queries to:
  Sally Ball, IFEG Secretary, +44 (0)20 7467 7115

Fax any of the above on +44 (0)20 7255 1472 or e: **lis@petroleum.co.uk** Visit our website at **www.petroleum.co.uk**

Planning for the use of oil spill dispersants

Third edition

This is the third edition of the IP's *Guidelines on oil spill dispersants*, which were originally published in 1979. The new edition has been produced to take account of recent advances in research and development work on the use of oil spill dispersants.

This new publication is intended to help managers (for example health & safety managers) plan for the use of dispersants as part of their response to an oil spill at sea. The guidelines are based upon general principles that are applied worldwide. They are built on the IMO/UNEP *Guidelines on oil spill dispersant application* (IMO, 1995), but are illustrated with specific examples and the regulatory framework from the UK. A companion document, *Operational guidelines on the use of oil spill dispersants*, concentrating on the practical steps needed to implement a dispersant response is also to be published by the IP.

ISBN 0 85293 316 9 25% discount for IP Members £60.00

API/IP 1584 Four-inch hydrant system components and arrangements

Third edition

This joint American Petroleum Institute/Institute of Petroleum publication provides the recommended minimum performance and mechanical specifications for the standardisation of the design of aviation fuel hydrant system pit valves and associated couplers. This ensures full interchangeability between components of various manufacturers.

This third edition replaces API 1584 second edition, December 1994, IP *Aviation hydrant pit systems recommended arrangements*, August 1990 and IP *The inspection and testing of airport hydrant pit valves*, July 1993.

It includes a performance test to ensure that couplers break away cleanly from the pit valve adapter if it is struck with a specific force. This aims to reduce the risk of fuel being released during refuelling caused by accidental coupler impact.

This important industry specification will be of use to all those involved in the design, manufacture, operation, maintenance and repair of aviation hydrant system pit valves and couplers.

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Multi-product pipelines: Minimum criteria to determine additive acceptability

Second edition

It is a requirement of multi-product pipelines to ensure that product treated with an additive, will, when transported, not subsequently affect other products transported in the pipeline. It is the responsibility of the supplier to submit product which complies with this condition. The requirement is particularly strict for aviation turbine kerosine, where positive segregation is lost during pipeline transportation.

Certain operators now require suppliers to be able to demonstrate, before the additive is used, that it will not affect the quality of other products, particularly of aviation turbine kerosene, being transported within the pipeline system. Therefore, this protocol has been developed primarily for the pipeline transportation of aviation turbine kerosine.

The first edition of the Protocol was published in 1997 and experienced gained by operators has led to recommendations for improvements in the technical guidance given. Many of the recommendations have ben incorporated into this new edition and significant changes have been made to Section 5 (laboratory screening) and Section 6 (pipeline movement, sampling and testing).

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All publications available for sale from Portland Press Ltd at listed prices inc. postage in Europe (outside Europe add £5.00). Contact Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK. Tel: +44 (0)1206 796 351. Fax: +44 (0)1206 799 331. e: sales@portlandpress.com

***For a complete and up-to-date listing of all IP Publications see our website:* www.petroleum.co.uk**

IP Discussion Groups & Events

Energy, Economics, Environment

LNG & CNG – Driving the Future

by **Mike Kesztenbaum,** Vice President, Consumer Products Division, BG Group

Monday 18 June 2001, 5 pm for 5.30 pm at the Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR

Contact: Laura Viscione
Tel: +44 (0)20 7467 7100

Energy, Economics, Environment

The Globalisation of LNG Trading: Consequences for the European Market

by **Morten Frisch,** Senior Partner, Morton Frisch Consulting

Monday 2 July 2001, 5 pm for 5.30 pm at the Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR

Contact: Laura Viscione
Tel: +44 (0)20 7467 7100

Energy, Economics, Environment

Programme of Events

11 October: **'West Africa – the Elephants' Graveyard'** by *Joseph Bryant*, President, Angola Business Unit, BP Exploration Operating Company

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Branch Activities

London

Contact: *Ian K Robinson Tel: +44 (0)1932 783774*

19 June: E-commerce, by a speaker from Arthur Andersen and Logility Inc, at the University of Surrey, Guildford

IFEG

INFORMATION FOR ENERGY GROUP

Internet Sources and Issues Relevant to the Energy Industries – 2001 Update

Tuesday, 7 September 2001

Afternoon Seminar, 2 pm to 5 pm (1 pm buffet lunch), Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR

Speakers will include: Keith Renwick, TDNet; Rev Graham P Cornish, British Library Document Supply Centre; Hazel Abbott, Electricity Association; and Catherine Cosgrove, Institute of Petroleum

This event will be sponsored by Everetts/TDNet
www.tdnet.com

Further information from Sally Ball, IFEG Secretary
61 New Cavendish Street, London W1G 7AR, UK
Tel : +44 (0)20 7467 7115; Fax: +44 (0)20 7255 1472;
e: **lis@petroleum.co.uk**

IP Certificates of Appreciation

Jeff Pym, IP Director General (right), presents Donald McPherson with an IP Certificate of Appreciation for his contribution to the Institute of Petroleum, especially the Stanlow Branch. Don is a Fellow of the IP and has been Honourary Treasurer of the Stanlow Branch since 1988.

Jeff Pym, IP Director General (left), presents John Wellsteed with an IP Certificate of Appreciation for his contribution to the Institute of Petroleum and the Stanlow Branch where he is Branch Secretary and Publicity Officer.

EVENTS Forthcoming

JUNE 2001

5–8 **Azerbaijan**
Caspian Oil & Gas 2001
Details: Spearhead Exhibitions, UK
Tel: +44 (0)20 8949 9222
Fax: +44 (0)20 8949 8186
e: caspian@spearhead.co.uk
www.caspianoilgas.co.uk

6–7 **Birmingham**
Heat Exchange Engineering Conference 2001– Diagnosing Faults & Improving Performance of Industrial Heat Exchangers
Details: TTM, UK
Tel: +44 (0)1789 765800
Fax: +44 (0)1789 765446
e: events@ttmprojects.com

6–7 **Algiers**
Algeria III
Details: SMi Energy Conferences, UK
Tel: +44 (0)20 7252 2222
Fax: +44 (0)20 7252 2272
e: customer_services@smiconferences.co.uk
www.smi-online.co.uk

10–12 **Kuala Lumpur**
Asia Oil & Gas Conference
Details: The Conference Connection, Singapore
Tel: +65 226 5280
Fax: +65 226 4117
e: info@cconnection.org

11–12 **London**
Power Plant Management, Operations & Maintenance
Details: IBC Global Conferences, UK
Tel: +44 (0)1932 893857
Fax: +44 (0)1932 893894
e: cust.serv@informa.com
www.ibcglobal.com

11–12 **Madrid**
Electricity and Natural Gas: Evolution and Opportunities in Two Converging Energy Markets
Details: Eurelectric, Belgium
Tel: +32 2 515 1000
Fax: +32 2 515 1010
e: eurelectric@eurelectric.org

11–13 **New York**
Export Credit and Political Risk
Details: IBC Global Conferences, UK
Tel: +44 (0)1932 893854
Fax: +44 (0)1932 893893
e: cust.serv@informa.com
www.ibc-financial.com

13–14 **London**
Flow Metering and Meter Proving
Details: Abacus International, UK
Tel: +44 (0)1953 497099
Fax: +44 (0)1953 497098
e: register@abacus-int.com

13–14 **Leeds**
International Dangerous Goods Update Seminar – Prepare for 2001's Fundamental Changes to the Regulations
Details: Pira, UK
Tel: +44 (0)1372 802105
Fax: +44 (0)1372 802243
e: susanc@pira.co.uk
www.piranet.com

13–14 **London**
Challenges of Heavy Crudes
Details: SMi Conferences, UK
Tel: +44 (0)20 7827 6052
Fax: +44 (0)20 7827 6053
e: energy@smi-conferences.co.uk

13–15 **Tucson, Arizona**
Natural Gas and Power Generation Strategies 2001 – Solving the Natural Gas and Energy Crisis
Details: Intertechusa, US
Tel: +1 207 781 9615
Fax: +1 207 781 2150
e: jonathan@intertechusa.com

13–15 **Cannes**
Multiphase 2001
Details: BHR Group, UK
Tel: +44 (0)1234 750422
Fax: +44 (0)1234 750074
e: twheeler@bhrgroup.com
www.bhrgroup.com

14–15 **Seville**
The European Oil Refining Conference & Exhibition
Details: WEFA Energy, UK
Tel: +44 (0)20 7566 1951
Fax: +44 (0)20 7566 1970
e: edward.bradfield@primark.com
www.wefa.com

17–22 **Norway**
Offshore and Polar Engineering Conference
Details: ISOPE
Tel: +1 408 980 1784
Fax: +1 408 980 1787
e: meetings@isope.org
www.isope.org

18–19 **Dublin**
Irish Energy III
Details: SMi Conferences, UK
Tel: +44 (0)20 7827 6052
Fax: +44 (0)20 7827 6053
e: energy@smi-conferences.co.uk
www.smi-conferences.co.uk

18–20 **Paris**
ERTC Computing Conference – Oil, Gas & Petrochemical Industries
Details: Global Technology Forum, UK
Tel: +44 (0)1737 365100
Fax: +44 (0)1737 365101
e: events@gtforum.com
www.gtforum.com

18–21 **London**
Hazard and Operability Studies (HAZOP)
Details: IBC Global Conferences, UK
Tel: +44 (0)1932 893857
Fax: +44 (0)1932 893893
e: cust.serv@informa.com
www.ibcglobal.com

19–21 **Stockholm**
Loss Prevention and Safety Promotion in the Process Industries
Details: European Federation of Chemical Engineering, UK
Tel: +46 8 5465 1500
Fax: +46 8 5465 1599
e: lp2001@stocon.se

26–28 **Chicago**
Synchronize for the New Global Economy
Details: VICS Collaborative Commerce, US
Tel: +1 617 527 4626
Fax: +1 617 527 7595
e: info@retailsystems.com

27–28 **London**
Carbon Sequestration for the Oil, Gas and Power Industry
Details: IBC Global Conferences, UK
Tel: +44 (0)1932 893857
Fax: +44 (0)1932 893893
e: cust.serv@informa.com
www.ibcglobal.com

27–28 **London**
Gas Commercialisation
Details: SMi Conferences, UK
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Fax: +44 (0)20 7827 6177
e: customer_services@smiconferences.co.uk
www.smi-online.co.uk

JULY 2001

2–6 **Leeds**
Engine Emissions Measurement
Details: University of Leeds, UK
Tel: +44 (0)113 233 2494
Fax: +44 (0)113 233 2511
e: cpd.speme@leeds.ac.uk
www.leeds.ac.uk

3–4 **London**
Kazakhstan Oil and Gas
Details: IBC Global Conferences
Tel: +44 (0)1932 893857
Fax: +44 (0)1932 893893
e: cust.serv@informa.com
www.ibcglobal.com

5–6 **Amsterdam**
European Gas
Details: IBC Global Conferences
Tel: +44 (0)1932 893857
Fax: +44 (0)1932 893893
e: cust.serv@informa.com
www.ibcglobal.com

MOVES People

Intergraph Process & Building Solutions has named two Executive Vice Presidents. **Kurt Ingenthron** is Executive Vice President of Technology and **Gerhard Sallinger**, Executive Vice President of Global Sales and Marketing.

Ramco Energy has named **Daniel Stover** Senior Vice President, Project Development.

Wincantin Logistics, the UK supply chain management company, has appointed **Victor Benjamin** to the post of Chairman.

Christine Wheeler has left CW Energy Tax Consultants and formed a new tax and commercial consultancy, Christine Wheeler & Associates.

Oil Recruitment, a specialist recruitment company company for the downstream oil and energy trading sectors, has appointed **Ruth Lemiech** as consultant.

Martin Webb has become the new Director General of the UK Petroleum Industry Association (UKPIA).

Roy Dafter has joined Grandfield, the business consultancy.

Kvaerner, the Anglo-Norwegian engineering and construction group, has appointed **Martin Hopcroft** Chief Financial Officer for its Oil and Gas activities worldwide.

Bob Cross, Northern Regional Director and **Don McIntyre**, Head of Highways and Traffic are both retiring from the UK Freight Transport Association (FTA).

Jacqueline Lecourtier has been named Scientific Director at IFP.

Gibb Environmental has appointed Environmental Management System and Environmental Impact Assessment Specialist, **Lucia Susani**, as Senior Consultant in the Planning, Assessment and Policy Division.

Uniqema, the chemical business of ICI, has announced the appointment of two Global Vice Presidents: **Chris Siemer**, Global Vice President Lubricants and **Barbara Kunz** Global Vice President, Enterprise.

Lord Fraser of Carmyllie QC has joined the Board of Alkane Energy, the commercial producers of methane gas.

Christian Pauchon has been named Director of the Drilling-Production Objective and **Slavik Kasztelan** Director of the Kinetics and Catalysis Division at the Institut Français Du Pétrole.

BJ Services has recently promoted *Simon Austin* to the newly created post of Shell Global Account Manager, following an agreement recently signed with Shell relating to worldwide cementing operations.

Burlington Resources, the independent oil and gas company, has recently appointed *Neil Ritson* Vice President and Managing Director of Burlington International in London. He was previously General Manager, North Africa.

Jet van Beusekom has been named Vice President Sales and Marketing of Vopak Vegoils.

Ronald Emerson has joined the Board of Premier Oil as a non-Executive Director.

Balmoral Group, the buoyancy, design and manufacturing company has named **Mike Aitkenhead** Group Business Development Director.

Victor Pipeline, a transporter of natural gas, has appointed **John Donaldson** Vice President, Marketing; **Linda Maiorana**, General Manager, Accounting, Regulatory and Administration and **Matt Malinowski**, Manager, Market Development.

***Adam Doggett* has joined Murco Petroleum as Company Station Specialist for the Western Region. He replaces Terry Jackson who is retiring after 33 years of service with the company.**

Egil Myklebust has been voted Chairman of the Board of Norsk Hydro. **Elisabeth Grieg** and **Ingvild Myhre** are new Board Members.

Sontrach has named **Abdelmalek Zitouni** as Secretary General, replacing Reda Lamlali.

Cambridge-based Michell Instruments, a manufacturer of hygrometry devices, has appointed **Andrew Stokes** Technical Director and **David Leonard** Finance Director.

Lars Carlsson has been elected the new Intertanko Chairman, replacing Westye Hoegh.

IntercontinentalExchange has named **David Goone** Senior Vice President.

National Grid Group has appointed **Steven Holliday** Executive Director with responsibility for Europe and Chief Executive of the National Grid Company.

David Emerson has been appointed Vice President of Strategy and Business Development at Baker Hughes Incorporated.

IP THE INSTITUTE OF PETROLEUM *presents*

ip://awards/2001

Date: 22 November 2001
Place: The Savoy Hotel, London W1, UK
Time: 12.30 pm

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Following on the success of the *IP Awards 2000*, the Institute of Petroleum is pleased to announce this year's suite of the petroleum industry's high-profile awards. The *IP Awards* are held annually to recognise excellence and achievement of companies and individuals, both from the industry and academia, who have had a resounding impact on the petroleum industry.

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Christine Pullen, IP Conference Supervisor
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