# Petroleum review october 1998

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# Petroleym

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#### ABBREVIATIONS

- The following are used throughout Petroleum Review.
  - mn = million (106)bn = billion (109)
  - tn = trillion (1012)
  - cf = cubic feet
  - cm = cubic metres
  - boe = barrels of oil
  - equivalent
  - t/y = tonnes/year

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

## © Institute of Petroleum

Front cover: False colour Landsat TM (thematic mapping) mosaic showing regional geological structure of the Republic of Azerbaijan

# CONTENTS







- NEWS
- UPSTREAM 3
- 8 INDUSTRY
- 10 DOWNSTREAM
- TECHNOLOGY 44

## SPECIAL FEATURES

- **AVIATION SPECIFICATIONS** 12 API 1581 - meeting the needs for the 21st century
- 15 FUELS RETAILING – WESTERN EUROPE An industry in transition
- 18 GAS - EUROPE A new phase of development
- 23 LIFETIME LEARNING - CONCEPT **IP Lifetime Learning initiatives**
- 24 LIFETIME LEARNING - LATEST DEVELOPMENTS Rapid progress over last 18 months
- 26 LIFETIME LEARNING - CRINE The Crine Network Education and Training Group and Lifetime Learning
- LIFETIME LEARNING MENTORING 27 Unlocking employees' capabilities, creativity and knowledge

## FEATURES

- 30 E&P – RISK MANAGEMENT Changing patterns of risks in exploration and production
- 33 **TECHNOLOGY – DIRECT FUEL INJECTION** Direct injection petrol engines to stop shift to diesel?
- **TECHNOLOGY FLOATERS** 35 Tackling demanding offshore environments
- 37 **EXPLORATION – REMOTE SENSING** Space-age onshore exploration
- 40 **CASPIAN – PIPELINES** Routes and finance the key to Azeri developments
- 42 **ONS – CONFERENCE REVIEW** Fears that low oil prices could hit future North Sea investment
- 43 GAS - CANADA Development for Sable Island six

## REGULARS

- 2 WEBWORLD
- STATISTICS 11
- **IP WEEK** 22 47 **STANDARDS**
- 49 **IP AWARDS**
- PUBLICATIONS 50
- FORTHCOMING EVENTS 51
- 52 MEMBERSHIP NEWS
- 54 **IP CONFERENCES & EXHIBITIONS** 55
  - DIARY
  - PEOPLE

56

The Institute of Petroleum as a body is not responsible either for the statements made or opinions expressed in these pages. Those readers wishing to attend future events advertised are advised to check with the contacts in the organisation listed, closer to the date, in case of late changes or cancellations.

- kW = kilowatts (103)
  - MW = megawatts (106) GW = gigawatts (109)
  - kWh = kilowatt hour
    - km = kilometre
    - b/d = barrels/day
- - sq km = square kilometres
  - t/d = tonnes/day



# **ROUNFrom the Editor**

## Is this the third oil shock?

Participants at the recent World Oil Prices conference in London, organised by CW Associates, showed a rare unanimity in their view that oil prices would remain low for two and maybe as much as four years. Whichever angle they approached the problem, they came to the same conclusion that sub-\$14/b Brent would be with us for a long time. While consensus does not make a prediction correct, it is interesting to note that Saga Petroleum, while issuing a profits warning and writing-down some of its North Sea assets, indicated that its planning assumption was \$14/b Brent until end 2001 when a rise to \$16/b is anticipated. Shell is also predicting that Brent will be in the \$12-16/b range for the next two to three years.

Sheik Zaki Yamani set the tone of the conference with his well-argued case that despite some very positive features, such as lower finding and production costs and much reduced price volatility compared with the 1970s and 1980s, he remained worried about the outlook for the industry: 'Wherever I look, I see problems for the oil industry. All the trends seem to point to the gloomy end of the spectrum.'

He then went on to enumerate what he saw as the main problems:

- The collapse of economic growth in the main Far East markets and the likelihood that even when growth returned the oil intensity would decline as the service sector became more important.
- Structural problems in Japan which may take a decade to sort out and the possibility of a major upheaval in Russia.
- High levels of consumer government taxation on oil products and the general trend to raise oil taxes, thereby depressing oil demand.
- The progressive whitening of the sales barrel, which allied with environmental concerns, has required massive refining and environmental investments.
- Opec's performance as manager of the surplus production capacity, particularly following the return of Iraq to large-scale production, has not been particularly successful.

Although some contested his pessimism about Opec, there were few prepared to contest the conclusion that the industry faced upheaval and change as it adapts to low oil prices.

One of the most challenging papers came from Abdlatif Al-Hamad, Director General and Chairman of the Arab Fund for Economic and Social Development. He noted that oil prices in real terms are in long-term decline and that is the fundamental reason for Opec's declining ability to set prices. Noting the continuing very high dependency of most Gulf states on oil for export and government revenue he warned that low prices were not a temporary phenomena, as many in the region tended to assume, and that radical change would be necessary. His view was that fundamental reviews of taxation and education policies were needed to allow the region to go forward and be less dependent on oil and gas revenues. He also felt that international investment needed to be encouraged to diversify economies and lessen dependence on the state for employment.

Confirmation of the escalating pressures on oil producers has just been provided by the annual development report from the United Nations Commission on Trade Aid and Development (Unctad). This anticipates declines of over 20% in the 1998 export earnings of Angola, Gabon, Iran, Kuwait, Nigeria and Venezuela which will cut their economic output by between 4% and 18%.

At the conference Mark Lewis of the consultants EMC noted that 1H1998 profits for the 20 of the largest quoted oil companies were \$5bn below year earlier levels. He also noted that non-Opec production levels could only be sustained after 2000 by new field developments that might be difficult to fund in a low oil price environment.

Dr Colin Campbell explained his thesis that the world was approaching the depletion midpoint when production would inevitably decline. Because the non-Opec producers are now close to this point, there will by 2005 be a massive financial transfer to the Opec producers as they will account for a rising proportion of global output, until they too reach their production mid-points around 2015–2020. (Dr Campbell is to give a talk, 'How soon will oil production peak?', at the Institute of Petroleum on Wednesday 25 November at 5 for 5.30pm; members and guests will be very welcome).

At the moment, the outlook for the industry looks bleak with asset writedowns, redundancies, closures, mergers and takeovers all in prospect. However, the industry remains one of the most flexible and adaptable in human history. Despite the crises of 1956 (Suez), 1973/74 (first oil shock), 1979 (second oil shock), 1986 (low prices) and 1991 (Gulf War) it has continued to grow and prosper. There seems no reason to believe that 'the third oil shock' won't be overcome in the same way as the earlier crises. One of the original uses of the Internet was to link academic institutions and material to facilitate the sharing of knowledge. The Web is still an unparalleled repository of data and is proving to be a vital research tool. Oil and gas are well represented, with a wealth of sites covering all aspects of the industry.

(leb Wor)

The Edinburgh Engineering Virtual Library (www.eevl.ac.uk) is the UK gateway to engineering information on the Internet. Users can search for sites by discipline, and access journals and news groups.

If earth science is your field, www.ldeo.columbia.edu/journal.html contains a comprehensive list of links to journals, individual articles, abstracts and publishers.

Many publishers now provide their catalogues online, so finding that elusive book or journal has never been easier. To encourage users they often include free newsletters and e-mail updates. Here is a selection of some of the major technical publishers:

- Elsevier (www.elsevier.nl) and Gulf Publishing (www.gulfpub.com) contain book catalogues.
- FT Energy (www.ftenergy.com) features newsletters, a list of publications and a free daily news service.
- McGraw Hill Energy and Business Newsletters (www.mhenergy.com), in addition to information about its own publications, has a list of useful links to US energy-related sites.
- Pennwell (www.pennwell.com) includes directories, databases and details of the International Petroleum Encyclopedia, Oil & Gas Journal Online, conferences, magazines and newsletters.

If you don't know who publishes the book you are looking for, try Amazon (www.amazon.com) or Bookpages (www.bookpages.co.uk). Both contain vast databases of books, searchable by a variety of criteria. You can also order online and delivery is usually within a few days. These services are particularly good for locating hard-to-find titles and technical material.

The British Library (www.bl.uk) is a useful source for finding bibliographical records. The site includes an OPAC (Online Public Access Catalogue) containing books, journals and conference papers. For a subscription fee you can also order material online.

You can find links to all of these pages, plus full details of all IP publications on our website www.petroleum.co.uk. If you have any questions regarding the IP website or the Internet in general, please contact Catherine Pope – cpope@petroleum.co.uk

# **NEW**<sub>Upstream</sub>

## Tarn onstream

The Tarn oil field on Alaska's North Slope has come onstream. The field is currently producing 18,000 b/d of oil from five wells and is expected to reach a production rate of 25,000 b/d from 20 wells (12 producers, 8 injectors) by the end of 1998. Peak production of 30,000 b/d is scheduled by late 1999.

Reserves are put at 50mn barrels. Production is processed through the existing Kuparuk facilities located nine miles northeast of Tarn. Full development of the field will include 40 wells from two drill sites and is expected to cost \$150mn.

Field partners are: Arco Alaska (operator, 55.29%), BP Exploration Alaska (39.28%), Unocal (4.95%), Mobil (0.36%) and Chevron (0.108%).

## **Dolphin development**

BG plc reports that the Dolphin Deep-1 discovery well on block 5a in the east coast marine area offshore Trinidad has tested at 36mn cf/d of gas and 430 b/d of condensate.

Block 5a is adjacent to block 6b which contains the Dolphin gas field, operated by BG on behalf of a 50:50 BG/Texaco joint venture.

The field currently supplies 170mn cf/d of gas to the National Gas Company of Trinidad and Tobago.

BG and Texaco expect that the natural gas reserves associated with Dolphin Deep-1 will be produced through the existing Dolphin field facilities, allowing for the early development and marketing of the Dolphin Deep-1 discovery.

## New treaty brings fresh life to Frigg pipeline

A revised Frigg Treaty and new framework agreement on pipeline developments have been signed by UK Minister for Energy and Industry John Battle and Norwegian Oil and Energy Minister Ms Marit Arnstad. The treaty will govern future use of the Frigg gas pipelines which link the North Sea Frigg field to St Fergus in Scotland. Revising the original 1976 treaty, the new agreement will extend the life of the two pipelines beyond the life of the Frigg field, which has diminishing gas reserves, by allowing gas from other UK and Norwegian fields to come ashore through the pipeline. The treaty also gives the UK jurisdiction over parts of the Norwegian-owned pipeline for the first time, with mutually agreed administrative procedures for the use and eventual decommissioning of the pipelines.

According to Battle, the treaty will

## Sincor funding

The Sincor project partners TOTAL (47%), PdVSA (38%) and Statoil (15%) have signed a \$1.2bn financing agreement with a banking syndicate in New York.

The Sincor project, which represents a total investment of \$3.6bn, will produce, process and market extra-heavy oil from Venezuela's Orinoco belt. Output is expected to plateau at 200,000 b/d of 8.5° API crude oil for a period of 35 years.

The crude will be pumped from horizontal wells and mixed with a diluent for transport 200 km via pipeline to the Jose terminal where it will be processed into high quality, low sulfur 32° API synthetic crude. Production of this light crude is scheduled to begin in 2001 and will plateau at 180,000 b/d. also 'improve the viability of marginal developments, in UK or Norwegian waters, which will be able to use the Frigg infrastructure in future'.

The UK Frigg pipeline is owned by Elf Exploration UK and TOTAL Oil Marine while the Norwegian Frigg pipeline is owned by Norsk Hydro, Statoil, Elf Norge and TOTAL Norge.

The new Framework Agreement on Inter-connecting Pipelines has simplified the process of agreeing construction and operation of pipelines crossing the UK/Norwegian boundary in the North Sea. Eliminating the need to negotiate a new treaty every time a cross-border link is required will 'encourage the development of new links to make more efficient use of existing infrastructure and improve the viability of marginal developments' stated Battle.

## North Sea asset swap

Shell UK and BP Exploration have agreed a North Sea asset swap. Shell is to acquire BP's 60.9785% interest in the pre-Tertiary horizons of block 30/3a and BP's 21.5% equity in the pre- and post-Tertiary horizons of adjacent block 30/2a. In exchange, BP will acquire from Shell an additional 2.36085% share in the producing Forties and Brimmond field plus cash.

Combined with Shell and Esso's recently concluded deal with Murphy Oil covering the deep horizons of block 30/2a, the new agreement consolidates Shell's position in the high pressure/high temperature play of the central North Sea near the Shell-operated Shearwater development.

## In Brief

United Kingdom

A total of 43 applications were made by groups involving 50 companies for 82 blocks on the UKCS in the UK's 18th offshore petroleum licensing round.

Smit Transport & Heavy Lift has secured a contract to perform heavy lift services at Cammell Laird's Birkenhead facility. The operation, scheduled for early October 1998, is required for the conversion of the Peregrine VII into a drill ship.

Schlumberger WellWatcher, part of Schlumberger's Wireline and Testing division, has been awarded four contracts by Amerada Hess, Lasmo, Shell Esso and TOTAL to install downhole permanent reservoir monitoring systems in the North Sea.

**Progenitive Services Ltd (PSL) has won** a three-year contract to supply pumping, coiled tubing, stimulation and nitrogen well services to Elf Exploration's operations in the UK sector of the North Sea.

Shell Expro reports that the UK Government has approved the Wood-GMC proposal for decommissioning the Brent Spar. It is proposed to use cleaned slices of the Spar's hull to build a quay extension at Mekjarvik near Stavanger in Norway.

**EVI Weatherford's Completion and** Oilfield Services Group has secured a contract to provide a broad package of products and services for the ongoing development of Shell Expro's North Sea Brent field. The three-year contract has two one-year extension options.

Shell Expro and co-venturers Esso Exploration and Production UK, Dana Petroleum and Burlington Resources have announced that central North Sea well 21/12-3 has tested at 8,200 b/d of oil. Options include a possible subsea tie-back to the nearby Kittiwake platform.

British-Borneo reports that west of Shetland well 204/14-1 has encountered a 'significant' oil and gas column. The well, operated by Conoco on behalf of Arco, Ranger and British-Borneo, has been logged and cored over the main objective and is now proceeding towards total depth.

# **NEW**<sub>Stream</sub>

## UK Government abandons North Sea tax reform

The UK Government has announced that it is abandoning proposals to increase North Sea oil and gas taxes in light of the collapse in world oil price.

Gordon Brown, UK Chancellor of the Exchequer stated that: 'The government has been monitoring changes in oil prices and I have concluded that at the current low level of oil prices it would not be right at this stage to proceed with reform of the regime.'

His statement did not make it clear, however, whether the government proposed to resurrect plans for a change in the fiscal regime should prices recover. The decision signals the end of a prolonged period of uncertainty for the UK oil and gas industry. Some operators had reduced levels of exploration drilling in response to the lack of clarity over tax policy and low oil prices, while BP chose to postpone development of its West of Shetland Clair field.

The UK Offshore Operators Association welcomed the government's announcement and commented that: 'The 18th Licensing Round, due to close on 11 September 1998, can now proceed with greater certainty'.

## Deepwater drilling world record set in GoM

Chevron and joint venture partners Shell, EEX Corporation and Enterprise Oil claim to have set a new water depth world record of 7,718 feet as they began drilling their initial exploratory test well in the Gulf of Mexico's Atwater Valley block 118, 175 miles southeast of New Orleans.

The companies believe that the Atwater Valley 118#1 well will reach a target depth of 15,471 feet below the seabed in 4Q1998. The well is being drilled by Global Marine's *Glomar Explorer*. The drill ship was recently outfitted with \$200mn worth of state-ofthe-art drilling and dynamic positioning technology following the signing of a five-year contract with Chevron and Texaco. The two companies plan to drill 20 deepwater wells in the Gulf of Mexico during this period. Together with Chevron's second drill ship, the *Transocean Deep Seas*, which is 100% owned by Chevron and is to be delivered in 2000, *Global Explorer* will enable Chevron to evaluate the potential of 80 ultra-deepwater prospects in the region.

## Tabasco development

Arco, BP Exploration, Unocal, Chevron and Mobil have applied for state permission to begin commercial production from the Tabasco oil field, a shallow, viscous oil accumulation that overlies the Kuparuk reservoir on Alaska's North Slope.

Test production began from a single well in May and output is currently more than 2,500 b/d. Development proposals are for the drilling of up to 20 production and injection wells over the next few years with production increasing to more than 10,000 b/d in 1999. Reserves are currently estimated at 20mn barrels of oil. A delineation drilling programme is planned to determine the full extent of the reservoir.

## **Trinidadian ventures**

Aberdeen-based Venture Production has acquired two assets onshore Trinidad. One licence is located in the Forest Reserve field and contains 100 wells, of which only five are currently active, the second is located on the southern flank of the Central Range and contains the Tabaquite gas and condensate field.

Recoverable reserves are put at more than 6mn boe. Production is currently averaging 600 boe/d and is targeted to exceed 2,000 boe/d in the next 18 months.

Gas production is sold directly to the National Gas Company while oil output is sold to state oil company Petrotrin.

## Simple solution planned for Kvitebjørn

Statoil, Norsk Hydro and Elf are to submit a development plan for the gas/condensate Kvitebjørn field in the North Sea before the end of the year. They proposed a simple steel processing platform with jacket-support topsides comprising units for drilling, gas/liquids separation and accommodation. The platform will help keep costs down, claims Statoil, as it will eliminate the need for a separate drilling rig.

Gas will be piped to the Troll Gas facility at Køllsnes or via Norsk Hydro's Oseberg or Heimdel fields in the North Sea. Liquids could be piped to Gullfaks, Statfjord or Oseberg.

Kvitebjørn field reserves are estimated to be in excess of 50bn cm of gas.

Norsk Hydro, operator of the Heimdal field in the Norwegian sector of the North Sea, has awarded the contract for the construction of a new Heimdal riser platform to Heerema. Transportation and installation

of the platform in spring 2000 will

be handled by Heerema Marine

Europe

In Brief

Contractors.

Saga Petroleum is reported to be planning to sell its 4.2% and 7% interests in the Visund and Oseberg South projects in the Norwegian sector of the North Sea as well as its 12% stake in the Miller field in the UK sector.

**Coflexip Stena Offshore Ltd (CSOL) has** secured a contract from Dansk Naturgas for the installation of the South Arne to Nybro subsea pipeline system, the second main gas pipeline network between the Danish oil and gas fields in the North Sea and the Danish mainland. First gas flow is scheduled for 1 July 1999.

**BP** is reported to have discovered major gas prospects in block 6305/7 in the deep waters offshore Trondheim, Norway. The Norwegian Petroleum Directorate is said to have announced tentative reserve estimates of 200bn to 400bn cm of gas. It is thought that the discovery may be connected to that recently made by Norsk Hydro in block 6305/1 to the north.

Enterprise Oil reports that its Alli-1 well in southern Italy has successfully appraised the extension of the Monte Alpi field into the Volturino concession, testing at 7,717 bld of oil.

Kvaerner Oilfield Products has signed \$45mn worth of contracts with Statoil and Norsk Hydro. It is to supply a template, christmas trees and control systems for pipelines and the umbilical on Norsk Hydro's Oseberg Sor (South) field in the Norwegian sector of the North Sea. Kvaerner is also to supply Statoil's Åsgard field with an export riser base, to be installed at a depth of 350 metres, that will act as the tie-in point for the platform to the field's gas export risers and pipelines.

Shell is understood to have signed an agreement with Turkish company Alsim Alarko to cooperate in upstream oil and gas projects in Turkey.

# **NEW**<sub>Upstream</sub>

## Dutch icebreakers bound for Caspian



Two icebreaking supply vessels – Arcticaborg and Antarcticaborg – were named on 14 August at Kvaerner Masa-Yard's Helsinki shipyard. Designed for operation in the northern Caspian Sea, the vessels are fitted to serve, on long term charter, drilling platforms operated by Offshore Kazakstan International Operating Company (OKIOC). The vessels are to be delivered to Dutch shipowning group Wagenborg in October 1998 (see Petroleum Review, May 1998).

According to Kvaerner, the shallow draught newbuildings are the first to

entirely follow the company's 'double acting' operating principle. In hard ice conditions the ships sail stern first, while in open water they operate conventionally with bow first. In addition to cargo carrying capacity (dry cargo on open stern cargo deck, a large cargo hold below deck, silos for pulverised goods and tanks for liquid cargo), the vessels are equipped with a towing arrangement to allow them to function as assistance icebreakers if so required. They are also fitted with fire fighting equipment to meet the requirements for a stand-by vessel.

## UK reserve base boosted by Blake field

UK consultant Arthur Andersen reports that it has added the largest field for over three years to the latest edition of its UK Continental Shelf Upstream Petroleum Database. The Blake oil field is operated by BG Exploration & Production and is located in the Moray Firth in block 13/24. The field has estimated recoverable reserves of 100mn barrels of oil. According to the company, this is the largest field to be added to its database since the West of Shetland's Schiehallion field in 1995.

The final development plan for Blake is still under consideration and may depend on its ultimate size. The choice is between an FPSO with a subsea cluster arrangement or a fixed platform. The field, which is located next to open acreage that will be available in the next UK offshore licensing round, is expected to come onstream by the end of 1999.

The field is one of six new accumulations to be elevated by the consultant to potentially commercial status, and thus designated for development in the next five years. Other fields that have been included in the latest study are the Cook discovery operated by Enterprise and estimated to have 35mn boe recoverable, and the BG-operated Seymour field with recoverable reserves estimated at 29mn boe.

The total number of fields added to the database's potentially commercial category in 1998 is now 16, which add a total of over 500mn boe to the UKCS reserve base. This figure equates to 2.8% of the UKCS commercial recoverable reserves. The 1998 figure is lower than the average of 3.1% for the last five years, states Arthur Andersen.

The consultant estimated in January 1998 that remaining commercial recoverable reserves for the UKCS were 10bn barrels of liquids and some 47tn cf of gas. The figures quoted only include fields in production, under development and potentially commercial, and do not include any reserves from the discoveries and any 'yet to find' categories.

## In Brief

North America

**TIW Corporation claims to have** achieved three Gulf of Mexico depth records in EEX Corporation's well in the Llano Prospect at Garden Banks 386. The records include deepest drilling liner at 25,145 feet, deepest production liner (measured depth) at 26,750 feet and deepest production liner (true vertical depth (TVD)) at 25,772 feet.

**Corridor Resources reports that the** Jupiter #1 exploration well on Anticosti Island has encountered shows of natural gas in several intervals but with no apparent commercial quantities of hydrocarbons. The well is the second of two wells drilled this summer as part of a four-well farm-in by Shell Canada and Encal Energy on licences held by Corridor.

#### Middle East

Bow Valley Energy and Premier Oil are reported to have formed a joint venture to develop the Balal oil field in the Persian Gulf offshore Iran.

Russia & Central Asia

Azeri state oil company Socar is seeking foreign partners to rehabilitate and expand five producing offshore fields – NGDU Narimanov, Bulla Deniz, Palchyg Tapesi, Neft Dashlary and Bakhar. Combined recoverable reserves are put at 450mn barrels of oil and 3.4tn cf of gas.

It is reported that the National Iranian Drilling Company is to drill four wells in Turkmenistan's Turkmenbashy region over the next 18 months at a cost of \$25mn.

Asia-Pacific

**Petrozuata, Venezuela's first extra**heavy crude upgrading project, is reported to have started production at the end of August. The \$2.4bn project is a 50:50 joint venture between PdVSA and Conoco.

**Premier Oil is reported to have made a** significant gas discovery with its Zarghun South-1 well on the Bolan concession in west Pakistan. It is thought that the discovery could hold up to 0.5tn cf of gas.

# **NEW**<sub>Stream</sub>

## Average price of Brent hits 12-year low

The price of Brent crude averaged \$12.06 in July 1998, the lowest in cash terms for 12 years, according to the latest Royal Bank of Scotland *Oil and Gas Index*. As a result, UK oil revenues in July were more than one-third lower than in July 1997. This was almost entirely due to the collapse in oil prices since the start of the year, states the Index.

According to Stephen Boyle, Head of Business Economics at the Royal Bank, there is little prospect of an imminent rise in oil price, especially with the added uncertainty caused by the turmoil in Russia. Commenting on the pattern seen in July he stated that: 'Stocks were high, there was no constraint on production, the slowdown in global economic growth was constraining the rate of growth in demand for oil products and Opec countries were not curbing demand to the extend they had promised.'

However, Boyle says that in spite of all this, the direct impact on UK activity levels has been minimal to date with few drilling contracts terminated and fewer projects abandoned.

Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price (\$/b)
2,458,846	6,018	18.41
2,428,302	5,883	18.38
2,526,529	6,376	18.49
2,619,632	8,249	19.89
2,553,987	10,075	19.07
2,709,258	10,950	17.38
2,598,757	11,081	15.20
2,582,700	10,355	14.07
2,595,594	9,841	13.17
2,571,241	9,233	13.53
2,433,059	6,412	14.40
2,406,521	6,273	12.12
2,419,423	5,685	12.06
	Oil production (av. b/d) 2,458,846 2,428,302 2,526,529 2,619,632 2,553,987 2,709,258 2,598,757 2,582,700 2,595,594 2,571,241 2,433,059 2,406,521 2,419,423	Oil production (av. b/d)Gas production (av. mn cf/d)2,458,8466,0182,428,3025,8832,526,5296,3762,619,6328,2492,553,98710,0752,709,25810,9502,598,75711,0812,582,70010,3552,595,5949,8412,571,2419,2332,433,0596,4122,406,5216,2732,419,4235,685

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

## Shell seals commercial gas deals

Shell Expro has signed three major commercial gas agreements between 10 oil and gas companies formalising the relationship between the central North Sea Shearwater and Elgin/Franklin field owners for use of the £430mn Shearwater–Elgin Area Line (SEAL) and the Shell/Esso Bacton gas terminal in Norfolk starting in 2000.

SEAL is the 176-km, 34-inch diameter, gas sales specification pipeline linking the Shearwater and Elgin/Franklin high pressure/high temperature fields directly to the Bacton gas terminal. Initially, the line will have the capacity to deliver 26mn cm/d of dry gas to the UK National Transmission System (NTS) or to the Interconnector for onward delivery to markets on the Continent. Following

## Phillips sets sights on Kazakh projects

Phillips Petroleum Company has acquired a 7.14% stake in 10 blocks in the Caspian Sea offshore Kazakhstan. Together with joint licensees Shell, Mobil, BP, Statoil, Agip, TOTAL and British Gas, Phillips is committed to drill six exploration wells, the first due to be spudded in 4Q1998, and conduct additional seismic work over six years. There is an option to extend the exploration phase capacity trials, throughput is expected to reach at least 31mn cm.

When the pipeline comes into operation in 2000, it will be the first time that gas from the central North Sea has been transported directly to the Bacton gas hub. The dry nature of the line, a result of offshore processing, is also claimed to be unique in UK waters delivering gas to Bacton that will meet both UK and Continental quality specifications.

Elf Exploration is development operator for SEAL and has laid some 437 km of the line to date. The company will hand over operator to Shell Expro following commissioning of the line. Shell Expro will then operate both the SEAL pipeline and terminal.

another two years. The initial production

phase of the production sharing contract is

for 20 years, with options to extend the

Phillips is also to study the development,

gathering and processing of natural gas,

and the extraction, fractionation, trans-

portation and marketing of natural gas

agreement a further 20 years.

liquids in the country.

## In Brief

Lasmo plans to increase production from the Dacion field in Venezuela to 16,000 bld by the end of 1998, 30,000 bld by mid-1999, 90,000 bld by mid-2001 and 120mn bld by the end of 2002. Gross redevelopment reserves are estimated at 550mn barrels.

Arco and Texaco have entered into a new petroleum contract with the Chinese National Offshore Oil Corporation to develop what is said to be China's second largest offshore oil field, the Qinhuangdao 32-6 field in Bohai Bay. CNOOC will act as operator, holding a 51% stake, Arco and Texaco each holding a 24.5% interest. Field start-up is scheduled for mid 2001, with production reaching 60,000 b/d in 2002. Oil in place is estimated to be in excess of 1bn barrels.

India's Oil and Natural Gas Corporation is reported to have invited 17 international oil companies to a possible farm-in covering the Cauvery, Krishna-Godavari deepsea exploration blocks and offshore Kerala-Konkan Basin.

Philippine National Oil Company is reported to have discovered what could be the Philippines' largest natural gas deposit on Fuga Island off northern Luzon. Potential reserves are put at between 5tn to 18tn cf of gas – four times larger than the Camago-Malampaya gas field offshore Palawan.

**TOTAL has made a new discovery on** the Jusepin permit in eastern Venezuela. The Cotoperi find, which tested at 7,650 b/d of oil, is located about 10 km from the Jusepin production field which currently produces 35,000 b/d from three wells.

Oil Search of Sydney, Australia, is reported to have completed its acquisition of BP's upstream oil and gas assets in Papua New Guinea for \$400mn. The company now holds interests in the Kutubu and Moran Central oil fields as well as the Hides and Angore gas projects.

It is understood that Unocal plans to invest \$1.4bn in natural gas exploration and production in Thailand over the next five years. The bulk of the funding will be spent on the company's major Pailin project in the Gulf of Thailand.

The Australian Government has awarded 13 oil and gas permits in the Bonaparte and Browse Basins offshore western Australia.



## Iraqi production set to triple?

At the recent World Oil Prices conference in London, organised by CW Associates, Dr Fadhil Chalabi of the Centre for Global Energy Studies (CGES) said that a CGES study done in collaboration with Petrolog Associates had concluded that Iraq's reserves could be double, or even triple, the currently claimed 112bn barrels and that under favourable financial and political conditions Iraq could produce up to 8mn b/d.

Iraq remains the least explored and developed of the world's major oil producers. A combination of wars and political conflicts have meant that its resources are underdeveloped relative to the potential and to other Gulf producers.

Until the Gulf War Iraq had been producing at levels of up to 3.5mn b/d with export capacity at 3.2mn b/d. Actual production capacity was around 3.8mn b/d.

According to Dr Chalabi, Iraq's current production capacity is some 2.2mn b/d made up of 750,000 from Kirkuk, 150,000 b/d from Bei Hassan and other northern fields, 1mn b/d of Basrah light from Rumaila and 300,000 b/d of Basrah medium from Rumaila.

Currently functioning export capacity is made up of 800,000 b/d via the northern pipeline system to Ceyhan and an additional 800,000 b/d through the Mina al Bakr terminal in the Gulf, giving a total of 1.6mn b/d. The balance of Iraqi production is accounted for by 620,000 b/d of 'local' consumption.

According to the analysis, Iraq could add 350,000 b/d of capacity within two to three months and 700,000 b/d within six months. The latter would require investments of \$340mn. However, for an expenditure of \$1.04bn the study estimates that capacity could be expanded by 1.2mn b/d, effectively restoring prewar capacity.

The study does not anticipate, given time, that export capacity would be a significant constraint. Reactivating the second pipeline to Ceyhan would add 800,000 b/d while capacity at Mina al Bakr could be expanded by 600,000 b/d. Rather more controversially the reopening of the Iraq-Syria pipeline would add 1.4mn b/d of export capacity.

At the moment Iraq is only able to export oil under the UN oil-for-food scheme. Under this, limited funds are granted for the slow rehabilitation of existing capacity. As this progresses, sustainable capacity is expected to rise to 2.65mn b/d by end-1999 from the current 2.3–2.3mn b/d. It would then rise to 3mn b/d by end-2000 and 3.4mn b/d by 2005.

However, if sanctions are lifted and there are no restrictions on inward investment, some or all of the planned new field developments could materialise. This would give Iraq a production capacity of 5.5mn b/d in 2005 and 6.5mn b/d by 2010.

It is estimated that future production costs will increase. Output per well has averaged 12,500 b/d but in the future is expected to be around 1,750 b/d with most new fields requiring water injection. This declining well productivity is reflected in the investment cost for new capacity. To date investment cost per peak daily barrel has cost around \$1,500. In the future this is expected to rise to \$4,750. Potential new field developments (Table 1) involve \$14bn-\$15bn of new investment but this potential 2.8mn b/d of capacity still represents some of the lowest cost capacity available anywhere.

According to the International Energy Agency (IEA), Irag produced 2.32mn b/d in July and 2.43mn b/d in August. Analysts' estimates of Iragi production fall in the 2.26mn to 2.55mn b/d range. Some press reports have suggested that the Iragi's are prepared to try to push production to 2.7mn b/d even though chemicals and spare parts authorised under the UN \$300mn rehabilitation programme are not yet in place. Current estimates are that even with boosted production Irag oil exports wil only total \$3.5bn to \$4bn in the period to 25 November rather than the \$5.25bn mandated by the UN.

Field name	Operator(s)	Cost (\$bn)	Production (b/d)
Majnoon	Elf	3.5	600,000
West Qurna	Lukoil et al	3.7	600,000
Nahr Umar	TOTAL	3.4	450,000
Nassiriyah	ENI, Repsol	1.9	300,000
Halfayah	CNPC, BHP	2.0	225,000
Ratawî	Petronas et al	1.0	200,000
Tuba, Gharaf, Rafidain etc		-	470,000
Total			2,845,000

Table 1: Iraq's major oil field developments, once sanctions are lifted

## In Brief

Latin America

Shell is reported to have acquired a 22.5% stake in the Acambuco gas field near the Bolivian border from Pan American Energy for \$200mn. Field reserves are put at 5tn cf of gas.



**Repsol (50%, operator), Apache (40%)** and Novus (10%) have reached an agreement to invest \$100mn on increasing oil production in the Khalda concession in Egypt from the current level of 30,000 b/d to 45,000 b/d by the end of 1999.

Angolan national oil company Sonangol and Elf (operator) have announced that the Lirio 1 well in block 17 offshore Angola has tested at 11,000 bld of oil.

Zarara Petroleum Resources and Leopardus Resources have announced that the Temane-3 exploration well in Mozambique has tested gas (and condensate) at a rate of up to 25mn cf/d. A further five wells are to be drilled over the next 18 months.

The Expro Group has entered into a Letter of Intent with Fred Olsen Production to provide and operate a 30,000 bld production facility onboard an Olsen vessel offshore West Africa. Production is scheduled to start at the end of 1998. The contract is valued at \$25mn over five years. Expro has also received a Letter of Intent from Kongsberg Offshore Services to design and supply deepwater completion systems for use on Elf's Girassol field, offshore Angola.

BG plc and partner Edison International have reported that the Scarab-2 well in the West Delta Deep Marine concession in Egypt has tested in excess of 30mn cf/d of gas.

The Expro Group has secured a contract from Moni Pulo Ltd and Brass Exploration, a Western Atlas subsidiary, to provide and operate a bargemounted production facility on the Efiat/Abana oil fields offshore Nigeria. Due to be operational in early 1999, the unit will process up to 50,000 b/d.

The South African Government is reported to have approved the development of the offshore EM and associated gas fields in the Bredasdorp Basin by Mossgas.

# NEWIndustry News In Brief

## Shell and Texaco merge European oil businesses

Shell Europe Oil Products and Texaco have unveiled plans to merge their European oil products marketing and manufacturing activities in a bid to 'improve shareholder returns and value for customers'.

The proposed venture, which could be operational by mid-1999, will market products using both the Shell and Texaco brands.

Although the decision to retain both brands could save on initial rebranding costs, it will fail to capture the economies of running a large pan-European single brand network, as is being done by BP/Mobil, comments UK consultant Wood Mackenzie.

Under the terms of a non-binding Memorandum of Understanding, Shell companies will hold an 88% stake in the new venture, Texaco holding the remaining 12%.

The deal will affect 4,300 Texaco staff and 25,000 Shell personnel. Assets include Texaco's Pembroke (100% owned) and Rotterdam (24%) refineries and Shell's 17 refineries in the UK, Netherlands, Germany, France, Denmark, Sweden, Switzerland, Norway, Turkey and the Czech Republic of which 11 are 100% owned by Shell, as well as 2,984 Texaco branded service stations and 12,954 Shell outlets (excluding 382 Gulf sites acquired in December 1997). Other assets include 3 Texaco and 13 Shell lube plants, and 11 100% owned and 23 partowned Texaco terminals and 78 100% owned and 255 part-owned Shell terminals throughout Europe.

The proposed alliance will not involve the companies' other activities in Europe or their LPG, coolants, international aviation and marine products businesses. The new venture is in addition to the Shell-Texaco alliance in the US.

According to Wood Mackenzie the combined market share of the two companies will be 'higher than is comfortable for Europe's competition authorities'. It points out that the competition authorities start to take an interest once market share exceeds 25%, creating problems for the merger in the Netherlands and Ireland, where the shares would exceed 30%, as well as in Norway, Luxembourg, Denmark, Switzerland and the UK.

The company points out that these shares are those for all branded market sales (retail plus other markets such as industrial and residential) and exclude wholesaling activities where Shell and Texaco sell to third parties for on-selling to the consumer.

Although the picture is much the same in the retail market, the position in the Netherlands takes the share to 42%, although the combined share exceeds the magic 25% in only six countries (see Table 1).

Looking more closely at the UK sector, according to Bristol-based analyst Catalist, retail market share and outlet share break down as shown in **Table 2** (p9)

These figures are taken from Catalist's surveyed national database of all UK retail petrol forecourts. Market cont'd p9

Country	Shell	Техасо	Combined
Netherlands	29.2	13.1	42.3
Ireland	15.0	17.0	32.0
Luxembourg	21.4	11.3	32.7
Norway	19.0	9.0*	28.0
Denmark	20.3	8.3*	28.6
Belgium	18.2	10.0	28.2
Greece	17.6	7.1	24.7
Switzerland	24.4	0	24.4
Finland	23.7	0	23.7
Sweden	18.2	0	18.2
UK	16.1	5.5	21.6
Austria	16.0	0	16.0
Portugal	14.9	0	14.9
Turkey	13.3	0	13.3
Germany	13.6	0	13.6
Italy	7.1	0	7.1
France	7.0	0	7.0
Spain	3.5	0.4	3.9

\*Texaco shares in Norway and Denmark are 50% of the share held by the Hydro–Texaco joint venture.

Source: Wood Mackenzie

Table 1: Retail market shares (%) by country in Europe

United Kingdom

Shell UK has stated that, contrary to some media reports, 2,000 jobs will not be lost as a result of the decision to vacate Shell-Mex House, one of the two large company headquarters buildings in London. Shell-Mex House is being vacated in a bid 'to save the costs of running and maintaining an expensive central London building'. states the company, and 'will involve staff relocation' to other offices, including Shell Centre, Between 200 and 300 jobs are to be transferred to Aberdeen. Shell also plans to vacate national head offices in the Netherlands, France and Germany.

UK independent oil companies British-Borneo and Hardy Oil & Gas have merged their operations in a deal valued at £910mn. The new company will be known as British-Borneo Oil & Gas, and will be the third largest UK independent after Enterprise Oil and Lasmo.

UK gas distributor Centrica has reported a 1H1998 net profit, excluding exceptional items, of £86mn compared with £36mn recorded in the same period a year earlier.

**Progenitive Services Ltd's well services** training programmes have been approved by the Scottish Qualifications Authority.

Monument Oil and Gas has reported a 1H1998 net profit of £6.8mn against £7.9mn in the same period a year earlier.

UK independent fuels retailer Save Group reports that 1H1998 company turnover increased by 2.3% to £208.4mn compared to the same period a year earlier. Profit before tax rose 11.4% to £3.52mn.

Europe

Saga Petroleum is reported to be the first major North Sea oil company to have announced plans to write down its assets in response to the weak oil price and disappointing exploration results in its Santa Fe licences. The company anticipates that the writeoff, which includes some NKr1.3bn in exploration acreage could wipe about NKr1.6bn off its net profits for 2H1998.

Greenergy Baltic of Helsinki has sold its oil and petroleum products trading activities to Enron Finland Energy.

# NEWindustry News In Brief

#### cont'd from p8

share is the percentage of the total estimated volume for motor fuels (excluding HGV) at sites surveyed as Texaco, Shell or associated brands. Outlet share is the percentage of the total number of sites surveyed as Texaco, Shell or associated brands. Market effectiveness is the market share divided by the outlet share.

Branded separately, Shell's UK market effectiveness is 1.09 and Texaco's 0.94. There are even higher penetrations in certain pockets of the market. For example, there are just over 500 sites in South Wales, of which Texaco and Shell combined have an estimated share of over 31%.

The future of the Texaco-Norsk Hydro joint venture in Denmark and Norway, established in 1995 and which took the two partners to market leadership in these countries, is questioned by Wood Mackenzie. It asks whether Norsk Hydro would want Shell as a partner rather than Texaco, or whether the Texaco-Hydro venture will be excluded from the proposed tie-up in the rest of Europe and perhaps be subject to a separate joint venture deal in the same way that the Shell/Texaco/Aramco deal has been in the US.

Looking at the refining sector, Wood Mackenzie states that the 'refining fit between the two companies is not ideal' and 'does nothing to address the issue of surplus refining capacity in Europe – at least as it stands'.

Even after the closure of Shell Haven and the disposal of Shell's Turkish refining interests (currently up for sale), the new alliance would have approximately 13% of European crude distillation unit (CDU) capacity and remain number one in this sector.

Region	Mkt share (%)	Outlet share (%)	Market effectiveness
Whole of UK	23.1	22.3	1.03
England	21.9	20.9	1.05
Wales	29.4	27.1	1.08
Scotland	29.9	28.4	1.05
Northern Ireland	29.9	28.9	1.03
Source: Catalist			

Table 2: Shell-Texaco joint venture's position in the UK market place

## Assessing global oil and gas prospects

World offshore oil production is set to increase by about 17% to 1,230mn tonnes (26mn b/d) in the year 2000, according to Mackay Consultants' latest report on *Prospects for the World Offshore Oil and Gas Industry 1998–2000.* This figure equates to an annual average of 4.4%, double the growth expected for the oil industry as a whole.

Offshore gas production is predicted to grow at an even faster rate of 27% in the same period, or an annual average of 6.7% per year. This is about 50% higher than the anticipated growth in offshore oil production. Much of the growth will come from new markets for gas in Africa and the Asia-Pacific region, states the report.

According to the company, the 'best indicator' of offshore activity is total offshore expenditure which is forecast to increase by 9% to just over \$94bn in the year 2000, an annual rise of 2.3%.

Such a growth rate is said to be well below the forecasts for offshore oil and gas production and also well below the actual average growth in expenditure over the last decade, which has been about 4.5%. The low forecast is attributed to the impacts of the fall in world oil prices and the economic problems in Asia.

The future of development projects in the current financial climate is also brought into question, and the report suggests that major projects such as Natuna (offshore Indonesia) and Clair (in the Atlantic Margin) will be delayed for the foreseeable future. Development expenditure forecasts are thus much lower than originally estimated in earlier editions of the report.

Exploration activity and expenditure are forecast to fall significantly over the next few years with the number of exploration and appraisal wells predicted to decline by 12% to 730 in 2000 and exploration expenditure by 14% to \$6.5bn.

Geographically, the consultants expect significant changes over the next few years. Activity and expenditure in the North Sea is predicted to decline, primarily due to a fall in UK production. The fastest growth areas are expected to be Asia-Pacific, despite the wider economic problems in the region, and Africa. **Kvaerner has unveiled plans for a** reorganisation of its operations in a bid to improve efficiencies and competitiveness.

Enterprise Oil has announced a 1H1998 profit after tax of £45mn, including an exceptional gain and a one-off payment which contributed a net £33mn. This compares with a 1H1997 figure of £80mn.

**TOTAL has reported total group sales** of FFr82.3bn in 1H1998, a decline of 14% compared with the same period a year earlier.

North America

**Gulfstream Resources Canada has** announced a fall in profits from \$6.3mn to \$3.4mn for the nine month period ending 30 June 1998.

Nova Corporation of Calgary is reported to have offered its 26% interest in Dynegy Inc to Chevron and British Gas, the other major shareholders in the Houston-based energy and natural gas marketer. It is thought that Nova is looking to sell its stake for more than \$460mn.

Pogo Producing Company has finalised its merger with Arch Petroleum. The combined company has an estimated 860.7bn cf of natural gas equivalent of proven oil and natural gas reserves.

**Russia & Central Asia** 

Elf has suspended negotiations regarding the purchase of a 12% stake in Russian oil company Sibneft in the light of the recent economic and financial crisis in Russia.

The Russian Government is understood to be reconsidering the price and terms under which it is selling a 5% stake in Gazprom in a bid to make the sale more attractive to foreign investors.



**PdVSA is reported to have announced** plans to scale back its oil production expansion programme by \$10bn to \$55bn and to stretch out the doubling of its production until 2008 instead of 2006. Under its new programme, PdVSA is seeking to encourage the private sector to fund \$30bn of its \$55bn expansion plan.

# **NEWS**wnstream

## New venture to fuel an alternative future

Shell International Oil Products and DBB Fuel Cell Engines, a subsidiary of Stuttgart-based Daimler-Benz, have signed an agreement which could pave the way to the early introduction of an environment friendly 'hydrogen car'.

The two companies are to jointly research ways in which to harness DBB's fuel cell technology with Shell's proprietary Catalytic Partial Oxidation (CPO) to develop a car which has the environmental advantages of fuel cell power plus the convenience of filling up at an existing station.

Fuel cell power is claimed to provide vehicles with at least the same performance as a traditional gasoline or diesel engine but with a vast reduction in harmful emissions and with almost no noise. Cars powered by fuel cell technology running on pure hydrogen are highly energy efficient and produce none of the pollutants, such as nitrogen oxide or soot particles associated with normal engines. They emit water instead. Daimler-Benz has already developed a number of prototype fuel cell vehicles, including a fleet using onboard hydrogen storage and cars using hydrogen converted onboard from methanol.

However, in order to broaden the technological base for fuel cell applications, other options are now being explored and multi-fuel processors, which can convert a range of fuels to hydrogen, are being considered.

Shell's CPO technology is claimed to have already shown that it is possible to convert liquid fuels into a hydrogen rich gas and work will now focus on marrying this process with DBB's fuel cell technology.

DBB is a strategic alliance between Daimler-Benz (51%), Ballard Power Systems (26%) and Ford Motor Company (23%). Dr Ferdinand Panik, Head of the Fuel Cell Project Group at Daimler-Benz, believes that the alliance will 'pave the way to make fuel cell powered cars available in 2004'.

## Chevron sells refining subsidiary

Chevron has completed the sale of its Gulf Oil Refining subsidiary to Petroplus UK Holding Ltd, a subsidiary of Petroplus International. Gulf's 115,000 b/d Milford Haven refinery ceased refining operations in December 1997 as part of Chevron's strategy to withdraw from the downstream oil business in the UK. Last year, the company sold its Gulf Oil (Great Britain) retail network, lubricants and commercial fuels interests to Shell UK and its 50% equity interest in Pembroke Cracking Company, a 90,000 b/d catalytic cracking facility, to Texaco.

It is understood that Petroplus intends to restart the Milford Haven facility's 20 MW power plant in order to export electricity and plans to operate the site as a thirdparty storage terminal.

The agreement also includes an option for Petroplus to use the refinery process units and equipment, although Chevron and Petroplus will continue to consider outside offers.

## August UK fuel prices

	Pence per litre
Diesel	
Lowest: Bradford	64.55
Highest: Inverness	69.77
National average	67.24
Unleaded petrol	
Lowest: Bradford	62.24
Highest: Dover	68.70
National average	66.61
Four-star petrol	
Lowest: London	68.73
Highest: Aberystwyth	76.47
National average	72.27

Source: PHH Allstar Fuel Report

## Shell signs solar deal

Shell Solar has signed an agreement with Conlog of South Africa to market a solar home system. Jointly developed by the two companies, the system is claimed to be ideal for those living in remote communities or without access to grid supplied electricity.

Magnetic cards are used to store prepaid power credit which is drawn down as it is used. According to Shell, it is the first time that magnetic card based pre-payment has been used for a solar home system and provides people with the opportunity to install solar power without having to make a large up-front investment in equipment.

The pre-payment charge also covers the installation and maintenance of the unit. The total concept is known as 'feefor-service'.

## In Brief

United Kingdom

Shell UK has announced plans to contract out its road tanker fleet operations which currently distribute Shell fuels throughout the UK. A strategic review of the current operations concluded that there was insufficient commercial, service or performance advantage to be gained from continued direct ownership and management of distribution assets and operations in the UK. Shell hopes to have the new distribution operation in place by mid-1999.

Kuwait Petroleum (GB) Ltd reports that it is to trial City Diesel, an ultralow sulfur fuel for diesel engines, at 16 selected service stations in the UK. The fuel will retail at the same price as ordinary diesel.

Wayne Dresser UK has appointed PDM Projects as its sole authorised agent for sales of its petrol pumps to the medium sized major and dealer markets. PDM will also offer a comprehensive consultancy review with solutions for site redevelopment.

Tesco has confirmed that it is in talks with Esso regarding joint trials of a Tesco Express convenience store concept at a limited number of Esso service stations in the UK.

Shell Gas Direct Ltd, responsible for natural (mains) gas sales to the UK industrial and commercial sectors, has acquired the marketing assets of Texaco Natural Gas in the UK for an undisclosed sum. Combined with Shell's recent acquisition of Esso's share of gas marketing company Quadrant, the new deal triples the size of Shell Gas Direct's customer base.

Europe

The European Parliament is reported to have approved the Auto-Oil programme's proposed standards for gasoline and diesel fuel and for exhaust emissions of gases such as carbon monoxide and nitrogen oxides. The programme can now be adopted into EU law.

Texaco and Elf Lubricants are reported to be planning to establish a 50:50 joint venture that will produce and sell coolants in Europe. It is understood that products will continue to be sold under the two companies' separate brandings.

# **NEV/Sownstream**

# In Brief

## Auto Oil legislation to impact EU refiners

Auto Oil I legislation sets out fuel quality and emission levels to be achieved by 2000 (see *Petroleum Review*, August 1998). The new standards require refiners to adjust the way in which they operate their refineries, according to Phil Morris, Refineries Strategist for Air Products, and, in turn, put considerable strain on the refinery H<sub>2</sub> (hydrogen) balance.

Morris summarises the main implications of the new legislation as follows:

- Reduced gasoline benzene will require the removal of benzene precursors in cat reformer feed, thereby reducing throughput and hence refinery H<sub>2</sub> supply.
- The introduction of a gasoline aromatics spec will tend to reduce cat reformer throughputs and severity, reducing refinery hydrogen supply.
- Introduction of a gasoline olefins spec will tend to restrict light cat cracked naphtha blending when, potentially, its relative volume in the gasoline pool could be increasing as reformate production reduces and the high sulfur cat naphtha (HCN) is dropped into the gasoil fraction.
- The reduced sulfur spec in gasoline will place considerable blending constraints on FCC based refineries. The refiner can selectively drop the high sulfur HCN into the gasoil pool, hydrotreat the cat gasoline or part of it, or hydrotreat the FCC feed with its additional knock on benefits to the whole FCC operation.
- Processing cat naphtha in naphtha hydrotreaters/cat reformers is likely to be hydrogen neutral with little impact on the refinery H<sub>2</sub> balance.
- In diesel, the increased cetane spec will require more cracked cycle

oils to be uneconomically routed to the fuel oil pool or require more severe hydrotreating.

- The reduced diesel density spec will limit/reduce the end point of cycle oil fractions.
- The introduction of the T95 diesel spec will result in lost diesel volumes requiring further cracking of this tail end product to make up the diesel pool shortfall – hydrocracking will be the preferred route.
- Polyaromatics will also restrict blending of the heavy cycle oil fractions.
- Reducing the sulfur spec in diesel will require deeper desulfurisation of all fractions with impacts on hydrotreater catalyst cycle life, hydrogen consumption and hydrogen purge rates to further stretch the refinery H<sub>2</sub> balance.

Morris also points out that Auto Oil II's year 2005 legislation will exacerbate all of the above problems as it calls for further reductions of sulfur and aromatics in gasoline and sulfur in diesel.

He also maintains that if further political influence is placed on the definition of auto fuel specs, notwithstanding Auto Oil II, much tighter specifications for olefins in gasoline can be expected as well as much more stringent specs for polyaromatics, cetane number and density in diesel.

<sup>7</sup>These will severely impact the refiners'  $H_2$  balance and processing options by at least an order of magnitude higher than for Auto Oil I.' states Morris. He estimates that EU refiners will require an additional 2,750 t/d of on-purpose hydrogen production to meet the tighter 2005 specifications proposed by the Members of the European Parliament (MEPs).

Kuwait Petroleum Corporation is reported to be planning to take over 157 BP-owned service stations in Belgium.

Shell Europe Oil Products has signed a Memorandum of Understanding with PetroFina under which Shell will swap an unspecified number of service stations in the Netherlands for Fina's downstream business in Norway by the end of 1998.



Russia and Vietnam are reported to have agreed a joint venture that will finance and build a \$1.3bn oil refinery at Dung Quat in central Vietnam.

Asia-Pacific

**Shell and Mobil have signed a** Memorandum of Understanding to combine their Australian refining operations in a new joint venture.

### Latin America

It is understood that Shell Capsa is paying up to \$240mn for PanAmerican Energy's 22.5% stake in the Acambuco gas area of northwest Argentina.

Africa

ETPM, the French oil services contractor, is to jointly develop with state oil company Sonangol a fabrication yard at Lobito in Angola. It is reported that ETPM hopes that Lobito will become the main operations hub for the growing southern African market.

#### UK Deliveries into Consumption (tonnes)

Products	†Jul 1997	*Jul 1998	†Jan–Jul 1997	*Jan-Jul 1998	% Change
Naphtha/LDF	157,234	283,980	1,064,155	1,760,523	65
ATF – Kerosene	795,825	869,644	4,735,860	5,069,752	6
Petrol	1,923,955	1,882,173	13,020,392	12,570,355	-3
of which unleaded	1,391,535	1,483,503	9,214,988	9,705,032	5
of which Super unleaded	42,311	36,349	313,302	242,719	-23
Premium unleaded	1,349,224	1,447,154	8,901,686	9,462,313	6
Burning Oil	173,531	204,978	1,925,929	2,031,915	6
Automotive Diesel	1,234,480	1,308,881	8,660,639	8,738,111	1
Gas/Diesel Oil	550,060	572,446	4,294,102	4,149,574	-3
Fuel Oil	219,737	188,721	2,547,830	1,651,018	-35
Lubricating Oil	74,793	70,277	516,852	491,823	-5
Other Products	802,585	732,652	4,996,325	4,780,781	-4
Total above	5,932,200	6,113,752	41,762,084	41,243,852	-1
Refinery Consumption	561,452	555,936	3,757,198	3,793,949	1
Total all products	6,493,652	6,669,688	45,519,282	45,037,801	-1
t Revised with adjustments *preliminary					

specifications

# API 1581 – meeting the needs for the 21st century

The American Petroleum Institute (API) rewrites the specification and qualification procedures for jet fuel filters, API 1581, every five years in order to incorporate improvements in testing and performance and to allow manufacturers to improve their final product. Edward Matulevicius,

Engineering Associate at Exxon Research & Engineering, outlines the changes anticipated in the next rewrite and the reasons underpinning the modifications. PI 1581, Specification and Qualification Procedures for Jet Fuel Filters, is a methodology for specifying filter/separators for jet fuel. It has two major purposes:

- To provide basic mechanical specifications for a filter/separator vessel. This assures that minimum requirements are met for vessels. It handles questions of materials of construction, auxiliary equipment, and basic test and sampling capability.
- To assure a common minimal standard for filter/separator performance. Tests are done on each model of coalescer and separator combination to show that the system is capable of removing water and dirt as well as dirt holding capacity. The premise is that these tests provide sufficient severity to assure good performance in the field.

Use of a specification provides for a consistent product in the field. The combination of the filter/coalescer, separator, and vessel has been tested and/or qualified by a set of rules against a tested vessel, viz by similarity. This assures that the filter/separator will operate properly in the field. On the other hand, use of a specification such as this stifles further development of improvement of filter/separator systems. There is little incentive for the vendor to make improvements in technology beyond the minimums specified in the specification.

API has attempted to overcome the latter deficit by rewriting the specification every five years. Improvements in testing and performance are modified to challenge the manufacturer to improve the product. Thus, there is an evolutionary improvement in filter/ separators that is imposed by the specification. The five-year period is not onerous in that it permits a reasonable life cycle for the filter/separator systems. The next revision is scheduled for June 1999. Is will be a major departure from previous editions.

### **Fuel tested**

Previous versions have dealt with two types of commercial fuel. The first is an unadditised fuel common in the US (Jet A), which is designated as Group I. The second fuel is an additised fuel more typical of Jet A1. This Group II fuel is additised with a static dissipater additive, Stadis 450, and a corrosion inhibitor, Hitec 580. In recent years, manufacturers have not offered Group I filters/separators. Most users prefer to specify Type II filters for all applications.

In addition, the US military has increasingly been moving towards API qualified elements for its systems. In JP-8, the fuel contains other additives, eg Di-EGME, an anti-icing additive, and DCI-4A, a corrosion inhibitor. Additional complexity has been added by the introduction of a thermal stability additive into the fuel (JP-8 + 100). This additive has been proved to adversely affect coalescence.

Thus, to accommodate a changing environment, the new specification will eliminate Group I fuels and add the military fuels to the qualification tests. To stress fuel more realistically, a sulfonate surfactant (Petronate L) is added to the fuel. Previously, the additives were the only stress imposed on the elements to test coalescence activity. The changes are shown in **Table 1**.

#### **Element types**

Past editions of API 1581 have assumed that the degree of cleanliness improved as fuel moved from the refinery to the airport. The assumption led to the specification of three classes of filter/coalescer elements. In the specification, these classes, viz ABC, were defined. Class A had to show more dirt holding capability and a higher accommodation for water.

However, in a jointly funded API/IP programme Vic Hughes (from Shell Research Ltd's Thornton Research Centre and Chairman of the IP Filtration Sub-Committee) sampled a large number of airports throughout the world. He examined filter membrane samples of into-airport, into-hydrant, and into-aircraft fuel and found that on average the amount of dirt in all three locations did not vary significantly. That is, on average the amount of dirt in jet fuel is similar at all points. The magnitude of dirt is similar to that currently specified in Class B filter/coalescers.

Water content in fuels also did not

seem to vary as to location. Antidotal evidence indicates that most fuel systems are relatively dry. Large slugs of water were not normally seen. It seemed to be more important to assure that coalescence was maintained than to assure that large slugs of water be handled by Class A filters. Hence, the specification added Petronate L as a test additive to simulate fuels that contained surfactants.

Finally, it was recognised that there are systems that do not have a significant amount of dirt in the system, or contain large amounts of dirt that could be removed better by micronic filters. In either event, a cheaper and/or more surfactant resistant filter/coalescer would be advantageous. The new edition has added a new type of filter that removes water and prevents dirt moving through the systems but does not have a high degree of dirt holding capacity. These elements, called Type S-LD, will hopefully offer a new alternative for users which should prove to be both economical and effective.

The differences in elements between the current and proposed editions of API 1581 are shown in **Table 2**. The difference between Type S and Type S-LD elements is that there are pressure drop requirements in addition to dirt transmission maximums for Type S elements (these are currently being developed). In Type S-LD elements there are no pressure drop requirements, only dirt transmission maximum standards.

### **Test conditions**

The current specification qualifies the filter/separator systems through a series of three tests. In Test Series 1, a single element test is run with fuel additises with 3.5 mg/l Stadis 450 only (Group II). Run 1 is a test for media migration. It measures how dirty the filter is after manufacture (dust, fibres etc) and whether the element tends to shed material. Run 2 tests coalescence ability by adding water at proscribed conditions and times (Table 2). Finally, Test Series 3 uses fully additised fuel (Table 1). Run 1 is the media migration test, Run 2 tests the dirt holding capability (Table 2), and Run 3 tests coalescence.

These series of tests, while comprehensive, tend to make gualification tests lengthy. Every time the vessel configuration changes, all three series of test must be performed to qualify the system. It was recognised that the single element tests for a large measure determines the performance of the filter/coalescer. The full-scale test determines the effect of fluid dynamics in the system. The proposed edition separates the need for running single element tests and fullscale tests. A single test determines the effectiveness of the filter/coalescer. However, the test is more severe than the current elements. The

fuel used is additised as in **Table 2**. There is a 30-minute media migration test which is followed by a 30-minute water coalescence test using 0.01% water. Next is a dirt holding test (**Table 2**) which lasts approximately 75 minutes (time is currently to be determined). This is then followed by a water coalescence test using 0.01% water for 150 minutes and 3% water for 30 minutes. This test can be used for a number of full-scale systems that meet certain configuration constraints, significantly simplifying the qualification procedure.

Full-scale tests are similar to the single element tests but are shorter. They are repeated to qualify a different system which is outside of previously qualified criteria. The criteria are outlined in the similarity section of the procedure.

#### Similarity

In the current edition, any qualified filter/separator system can be used to qualify other systems providing they meet a set of rigid rules. The similarity criteria ensure that the new vessel is not more severe than the tested and qualified vessel. Rules specify distances between elements, area ratio between the vessel and elements, and flow rates through the filter/coalescer and separator. While the concept is correct, the actual implementation is simplistic. Manufacturers will usually test new vessel designs to ensure they

Cu	rrent		Proposed
Group	Additives	Category	Additives
l (J(Jet A)	None	C (Commercial)	3.5 mg/l Stadis 450 2.9 mg/l Hitec 580
ll(Jet A/Jet A1)	3.5 mg/l Stadis 450 2.9 mg/l Hitec 580	M(JP-8)	3.5 mg/l Stadis 450 22 mg/l DCI-4A 0.2% Di-EGME
		M100 (JP-8 + 100)	0.4 mg/l Petronate L As M & 125 mg/l Betz additive

#### Table 1: Test fuels proposed for new edition of API 1581

Class	Current Dirt (mg/l)	Water (vol%)	Туре	Proposed Dirt (Mg/l)	Water (vol%)
A	53	0.01% (60 min) 3.0% (30 min) 10.0% (10 min)	S	35	0.01% (60 min) 3.0% (30 min)
В	35	0.01% (60 min) 3.0% (30 min)	S-LD	35	0.01% (60 min)
с	18	0.01% (60 min) 0.5% (30 min)			5.070 (50 min)

Table 2: Element types

Aviation

will properly coalesce water. However, it is not clear that these tests ensure that competitors' elements will work in that system even though they meet the similarity criteria.

Currently, the proposed edition intends to use more sophisticated modelling to make sure that vessel designs are, in fact, similar to the tested vessel. This should ensure that new and existing designs will work properly when scaled from a limited number of tests.

## **Particulates problem**

A serious limitation of the current edition is that a very fine red iron oxide is used. This oxide has an average diameter of approximately  $0.25\mu$ m. Data have shown that this material agglomerates to particles averaging approximately 5 to  $10\mu$ m. The amount of agglomeration is a strong function of the additives in the fuel. Thus, the present system cannot significantly vary the additives used without changing the size of the particle and hence the results. For example, JP-8 + 100 fuel will disperse the red iron oxide significantly.

To alleviate this condition, a new particulate system was chosen. A survey of engine and aircraft manufacturers indicated that onboard filters would remove particles greater than 20 to 50µm and larger. Calculations indicate that particulates less than ~1µm will generally follow streamlines and hence be removed from the system without adverse effects. It is particles in the 1 to 10µm range which can deviate from the streamlines and hence deposit on equipment. With this in mind, a number of tests were carried out to determine agglomeration and behaviour in this size range. Based on a number of factors, a 90/10 mixture of ultrafine test dust and R998 red iron oxide was selected. The ultrafine is a clay type material (primarily silica dust) with a volume average diameter of ~4.5µm and a number average of ~1.2µm. The R998 material is a red iron oxide of a volume average of approximately 2.5µm and a number average of ~0.65µm. While some agglomeration still occurs, the degree and effect is minimised. This permits use of more additives and contaminants without affecting results significantly.

## Setting a new base

Revision of the current API 1581 document is a significant change. It is intended to set a new base for qualifying elements, and permits using additives and contaminants more in line with what is in fuels. It accounts

# Strategic review of jet fuel specification requirements

G Datschefski, C Lewis and M B Walters (Available from P5 Brook, Defence Research and Evaluation Agency, Fuels and Lubricants Centre, DERA Pyestock, Farnborough, Hants GU14 OLS, UK). 198 pages. Price: £80 or \$140, including postage and packaging.

This A4, soft-covered tome is the result of a review of the current requirements of the UK Ministry of Defence jet fuel specification (Defence Standard 91-91), the test methods called up, and the limits applied in relation to the control of fuel quality for use in current and future aircraft. As such, it has relevance to both civil and military markets since the MoD specification is widely used to control UK civil jet fuel quality.

The authors – from DERA SP-101, Defence Research and Evaluation Agency – have extensive knowledge of the petroleum and aero engine industries. They provide analysis of the chemical, physical and engineering aspects of fuel quality in five main areas: pumpability, thermal and storage stability, material compatibility, combustion and fuel handling. Each area is covered by a separate chapter, covering 50 years of history from the first UK jet fuel specification, the current situation and options for the future. Each chapter concludes with a summary of the relevant fuel properties and how they interact with one another.

The main body of the book is devoted to AVTUR/Jet A-1, while the subject of lowflash, wide-cut fuel is covered in an appendix. Reference is made throughout the book to IP and ASTM test methods. The history and performance aspects of the different types of additives approved for use in jet fuel are covered in the relevant chapters.

Current issues are also addressed, including the potential for replacement of freeze point as a criterion of pumpability by a low temperature flow test, developments of the JFTOT method for the assessment of thermal stability which relates more closely to in-flight fuel degradation, and the assessment of fuel lubricity at future fuel-system temperatures. The US Air Force programme to put into service jet fuel of improved thermal stability (the HiTTs or KJP-8 + 100 programme), which will result in a 55°C increase in thermal stability requirement and a 50% increase in available heat capacity by use of suitable additive packages, is also covered. However, the book was completed too early to include reference to the Boeing 747 crash (TWA Flight 800) in July 1996 or to the subsequent investigation by the US Federal Aviation Administration which may lead to significant changes in the way in which jet fuel flammability is specified.

The final chapter summarises those changes which are thought to be necessary in order to bring jet fuel specifications up to date in terms of engine design, test methods and fuel production developments.

This publication represents an excellent source of reference for all those concerned with aviation fuel quality. Although slanted towards the scientist and technologist, it will also be of use to those involved with contracts and legal issues. Numbered references are provided throughout the book for those who require additional information.

Chris Bartlett Chairman, IP Test Methods Standardization Committee

for elements which will be used in the military, simplifies testing and provides for scale-up criteria which are more realistic. The system also allows qualified elements to be used at the same flow rate as when qualified in more severe fuels – ie elements qualified in M100 fuel can be used in M and C fuels etc – and allows the use of multistage systems when tested in this procedure.

Hopefully this marks the introduction of elements that are safer and more suitable for meeting the challenges of the 21st century. As with any new concepts, the strength of the idea is a function of the discourse and criticisms to which the idea is subjected. Those in the industry have been active partners and we hope this paper will help further the discussion for this and subsequent editions.

This paper was due to be presented at the IP/API International Conference and Exhibition on Aviation 2000 – Safety Operations, held in London on 1–2 October 1998. A set of conference papers can be purchased at a cost of £100 (VAT exempt) from the IP Library. Please contact Liliana El Minyawi on +44 (0)171 467 7113 for copies.

## Fuels retailing Western Europe

# An industry in transition

The western European service station market is in a period of major restructuring. Poor performance in the refining sector and over capacity in gasoline production has led to growing pressure on petroleum product marketing to subsidise the increasingly reduced margins of refining operations, according to a new report from UK consultant MarketLine International.

ntitled Western European Service Stations – Profitable Strategies for Forecourt Retailing, the report states that increased price competition has led to diminished margins at the pump while environmental legislation and the requirements set out by the EC Auto-Oil Programme continue to necessitate large investment in service station networks. In addition, volume stagnation combined with hypermarket penetration into fuel retailing means that there is ever-increasing competition for an ever-decreasing market.

The result of these factors is that the western European service station market is experiencing a relatively rapid transition of its profit base from fuel to the forecourt shop. Correspondingly, companies are restructuring their fuel retailing investment programmes in their attempt to dramatically restructure their networks to ensure profitability for the future.

MarketLine carried out a survey of leading oil industry executives from every country in western Europe in June and July 1998 in order to ascertain the implications of this transitional period for the western European service station sector. The main survey findings were that the sector will experience increased price competition, high levels of site network rationalisation, and further development of the non-fuel offering over the next five years. In terms of customer acquisition and retention, both fuel price and the forecourt shop offering are set to be the most important factors across the region.

## A stagnating market

The company valued the western European service station market in 1997 at \$253.2bn. Within this, \$37.9bn or 15%, was accounted for by non-fuels sales while the remaining \$215.3bn was generated by fuel sales of 2,439bn litres. This represented a drop in sales of over 2bn litres from 1996. According to the report. the problems of overcapacity in the refining sectors have been compounded by this lack of market growth. Indeed, the increase in demand for automotive fuel has virtually stagnated across the region over the last five years, running at an annual compound growth rate of 0.44% (1993-97). What is more, three countries, including the two largest fuel volume markets of France and Germany, realised a decline in volume sales over the period with France recording the highest rate of decline of 2.7% per year. However, within this overall market

stagnation there is a discernible group of countries with markets which experienced growth during the period 1993–97 and are expected to continue to grow up to 2003 and beyond. Of these countries, the most significant is the Mediterranean group - Spain, Portugal, Greece and Italy. The report indicates that in these markets, the combination of increased prosperity, improving infrastructure and deregulation has already led to strong growth. For example, fuel volume sales in Greece and Portugal grew at a compound annual rate of 3.7% from 1993-97. This volume growth has, in turn, initiated large scale investment by both the oil majors and hypermarkets which are seeking to establish a strong position in order to reap the benefits of future growth.

## Rationalisation

Looking at rationalisation within the western European service station sector, the study states that there were 122,998 service station sites in the region in mid-1997, 2,307 less than in 1996. Indeed, in the period 1993–97 the site network of western Europe steadily decreased as described by a compound annual rate of decline of 1,88%.

Over the period 1998–2003 the total is expected to fall by a further 20,061 with the result that in mid-2003 there will be only 102,937 sites in western Europe.

### Compounding problems

The problems of overproduction within the refining sector are being compounded by the increasing share of fuel sales accounted for by autodiesel. Over the period 1993–97 gasoline volume sales in western Europe actually declined by a compound annual rate of 0.5% while autodiesel volume sales grew at a rate of 2.4%.

Operational profitability has been further hindered by the need for the high level of investment that is required to meet the stringent demands of the Auto-Oil programme. The almost universal response from the oil companies has been to incorporate the necessary modernisation into a programme of network rationalisation. Thus, the majority of networks have witnessed high levels of site closures, with the savings made translated into investment in remaining sites.

This process of rationalisation has developed in some instances to the level of mergers, acquisitions and joint ventures. Although this is not a new trend, the BP/Mobil and Hydro/Texaco joint ventures have been in operation for several years, it is becoming increasingly frequent in the mature markets of western Europe. The report suggests that while the planned BP/Amoco merger will have no direct impact on the western European service station market, it may encourage further mergers/acquisitions among the major European oil companies.

The most significant merger in 1997 was between Agip Petroli and Italiana Petroli leaving the new operation as the clear market leader in Italy and facilitating the high level of site closures necessary in this over-serviced market.

### Hypermarket penetration

The process of rationalisation has also been forced upon the oil companies by the increasing market penetration of the hypermarkets which has become an issue of major importance for western Europe as a whole. The highest levels of hypermarket penetration are shown to have taken place in the three largest markets Germany, the UK and France. The hypermarkets also reported to pose the largest threat in the Spanish and Italian markets (the fourth and fifth largest volume markets in the region) where recent deregulation and prevailing economic conditions make the markets ripe for hypermarket penetration.

In their attempt to compete with the hypermarkets there are a number of options available to the oil companies. In Scandinavia there has been a large increase in site automation as the cost savings of unmanned sites facilitate more effective price competition. Price certainly is the most significant factor across western Europe in influencing market share as has been demonstrated by the rise of the hypermarkets as indicated in the report. However, traditionally the oil companies have competed on terms of fuel quality. In 1996, Esso attempted to combine this traditional emphasis on quality with low prices in its 'PriceWatch' campaigns and the initial success of the campaign indicated that, when faced with the option of hypermarket fuel or oil company fuel at similar prices, the consumer did indeed choose the latter on grounds of quality.

However, in the longer term the campaign failed in its primary aim of stemming hypermarket erosion of fuel sales, states MarketLine, as is demonstrated by the increased share held by hypermarkets in the UK and Esso's decision not to adopt a similar campaign in the German market.

## Developing the forecourt shop

For the conventional sector, the failure of PriceWatch to take back fuel volume sales from the hypermarkets has provided further proof that it is essential to

## Forecourt technology in the fast lane

s fuel retailers vie for competitive advantage over rivals they are seeking out products that will add value to the service they can provide to motorists on the forecourt. As such, petrol pump technology is set to 'hot up' in order to satisfy the needs of fuel retailers who, in their drive for market share are aiming to pamper motorists and make the trip to the forecourt a more speedy and troublefree experience.

'One such advance is the use of video screens on petrol pumps,' predicts Dave Kerr, Sales and Marketing Manager of Wayne Dresser. 'These can be used to run adverts for specific products and promotions, or give out weather and traffic information. Customers can even order a car wash or goods such as fast food from the shop, via a touch screen whilst filling up. The screens are user friendly and attract customers to the forecourt. They increase profits by maximising motorist's exposure to the retailer's advertising manager and increase the level of service provided to the customer."

Kerr also points out that fuel payment systems are changing. Up until now the fastest payment method has been the use of integrated payment terminals which allow for the payment of fuel by credit card at the pump. These have been around for a few years and are most commonly found on UK supermarket sites.

However, this method of payment could soon be facing competition from a new system developed by Wayne Dresser which allows the motorist to use a key ring tag for instant payment. All the motorist has to do is pull up and wave the key tag by the pump, fill up and drive off. Such a system eliminates the need for cards or cash and reduces lengthy queues at the kiosk, states the company. The Wayne Trac system is fitted with a remote activation device (transponder). The pump reads a signal from the tag and the transaction is instantly processed and charged to the user's credit card. Drivers can also opt for a discreet car rear window attachment instead of a key tag.

The system is simple to install, use and service, states the manufacturer. The device can also link in with loyalty programmes, enabling retailers to build up data on individual customer buying trends. A further application is the use of the tag to prompt a video screen on to the pump or a cashier to inform the driver that a certain level of loyalty points have been attained which can now be 'spent' in the forecourt shop. The tag can also be used in conjunction with other retailers to maximise joint marketing efforts. Fleet managers can use the system to track fuel expenditure by individual driver and the tag can contain information identifying a particular vehicle as part of a fleet.

Wayne Dresser claims that the key tag system can enable sites to act as 24hour self service outlets, thus saving on labour costs and optimising site usage.

The product has already been piloted and rolled out in the US, with some 3,000 service stations now operating the system and one million tags having been distributed. The tag uses radio frequency identification technology from Texas Instruments and has been developed as a result of cooperation between Wayne and Texas Instruments.

Commenting on the Wayne Trac development, Kerr says: 'I believe that there was previously a concern that these sort of quick payment methods would deter motorists from entering the kiosk, which is currently the most profitable area of the forecourt. Now there seems to be a realisation that by providing quick payment facilities, petrol retailers can closely target the needs of a "busy" section of their market and so boost their profits. Filling up has often been thought of as a "distress purchase", motorists want to be on and off a forecourt quickly, particularly commercial travellers. Petrol retailers are aware of this and are attempting to gain competitive advantage by making the trip to the forecourt a more speedy and enjoyable experience. Importantly, such motorists will seek out petrol stations that offer a fast lane service and will make repeat stops as filling up becomes less of an inconvenience. Figures from the US indicate a 25% increase in throughput as a result of installing the system.

'On the other hand, those motorists that do not seek a fast lane service and do intend to pay in the kiosk and possibly do some top-up shopping or buy their morning paper have more time to browse and this will lead to an increase in impulse buys. In effect, fast payment systems are a win-win situation for retailer and motorist alike. Increased service leading to increased loyalty, throughput and profits for retailers.'



restructure the operational profit base of service station networks by developing non-fuel portfolios. It is in these areas that companies will be able to generate margins which will ensure profitability in the future. It is essential, especially in the more mature marketplaces of the region, that companies balance their relatively low margins on fuel with higher margins achieved through the sale of non-fuel products and services. MarketLine believes that building service station volume and specifically non-fuel portfolio sales over the next five years will require a balance between network conformity and regionally specific requirements. For example, the mini-supermarket type offering and hot food and drinks will be of little value in the Mediterranean markets where consumers are unfamiliar with the concept of shopping on the forecourt. However, in central

#### Europe where consumers are already accustomed to utilising forecourt shops for top-up shopping, the mini-supermarket concept is expected to be a valuable tool over the next five years.

### **Future trends**

The report suggests that the western European service station industry is set to witness a combination of rationalisation and development of non-fuel offerings. The degree to which these processes will occur will vary from country to country with the dominant trend being one of high rationalisation and high-medium development of non-fuel offerings.

The main exceptions to this trend will be in Portugal and Spain where site numbers are expected to expand over the period, although non-fuel offerings will be developed in order to stave off the threat of hypermarkets and as a tool to differentiate the major oil companies from one another.

Copies of the Western European Service Stations reports are available from Marketline International. Contact Jeff Haward, Sales Manager, on Tel: +44 (0)171 624 2200 or Fax: +44 (0)171 372 0130. *Petroleum Review* readers are entitled to a 5% discount on the report's retail price of \$1,795.

## Paying at the pump

uwait Petroleum (Q8) unveiled the first of its unmanned service stations on supermarket sites at a new Waitrose store in Newark-on-Trent in September 1997. It operates another site at a Budgens store in Mount Sorrel, Cambridgeshire. According to the company, the 'automat' concept has 'proved popular' with customers and plans are to roll out a number of other sites in the pilot programme over forthcoming months.

The automat enables supermarkets to provide customers with the extra service of a service station but in a quarter of the space. Unlike traditional petrol stations, the automat sites have no kiosk. Instead, shoppers simply pay at the pump with



their choice of a credit, debit or fleet card or use a Quick Fuel card which allows customers to buy their fuel and shopping in a single transaction at the supermarket checkout. Users are therefore able to fill up and pay without leaving the car or queueing for a second time. According to Q8, the new concept has reduced congestion on the forecourt by 88%.

Commenting on the new system, Graham Heald, Manager at Waitrose's Newark branch says: 'Our customers in Newark see petrol as a key element of the modern supermarket and very much regard the automat as a positive benefit which saves them time. Parents are particularly appreciative of the fact that they are able to stay with their children while purchasing petrol.'

#### Card versus cash

Analysis of methods of payment at automat sites reveals that how customers pay at the pump reflects the split between cash, credit and debit cards in the actual supermarket. While payment by card is on the increase, over 50% of the UK population still likes the financial control of buying groceries with cash. The Quick Fuel card, available in £5 denominations at the till in the supermarket, enables these customers to make use of the automat while still retaining peace of mind, states Q8.

Steve Boocock, Marketing Manager of Kuwait Petroleum (GB) Ltd, says: 'Supermarkets these days fully recognise the importance of offering their customers the option to buy fuel during the weekly shop. We believe technological advances like the automat, which allows supermarkets to improve service in a highly competitive market, will become increasingly important.'

## A new phase of development

This year has been one in which the European gas industry has seen important milestones reached. In the UK, full liberalisation of the gas market was achieved and in continental Europe companies began – in their different ways – to react to the requirements of the EU's Gas Directive, passed in May. *Eloise Logan* reports.

57.5

when the last remaining part of the UK domestic (household) gas market was made fully competitive on 23 May 1998, a milestone was passed for the country's gas industry. Gas consumers in the UK now enjoy greater freedom of choice than their counterparts anywhere else in the world.

The UK position is the culmination of a process which began with the passing of the Oil and Gas Enterprise Act in 1982. The mechanics of setting up a fully open market were complex in the extreme and drew fire from all sides. Particularly criticised, though, were the Network Code, which governs the operation of the UK pipeline network, and the question of storage, which is still being debated.

Nevertheless, over the last five years the UK gas market has been entirely transformed. By the time competition was first extended into the domestic market in 1996, UK gas prices generally were falling and a spot market in gas was developing for the first time.

This new market opportunity was seized by many would-be players, from small trading operations to large, integrated energy companies. Many companies which were traditionally only gas-buyers, if they were involved with gas at all, like the power generators and the regional electricity companies (RECs), began to trade gas as part of their business.

However, from the beginning the view in the industry was that some fall-out would be inevitable among the players. Although the new market offered a whole range of buyers, it was very volatile, and a whole range of new skills and investments was required to establish a commercially successful business.

A recent development which could close down a market channel for gas marketers – that of gas for power generation – and thus increase the market's volatility is the UK Department of Trade and Industry's Review of Energy Sources for Power Generation.

The consultation document proposes that the government's moratorium on additional gas-fired power plants, which began in December 1997, should be extended until the 'distortions' in the operation of the electricity pricing market (the Pool) are sorted out. The intention is to lower electricity prices by at least 10%. No time limit is set. The potential impact on the upstream (offshore) part of the industry of such a moratorium has been estimated in a study by consultant Arthur D Little. It concludes that a reduction of £0.7bn in exploration investment and of £0.5bn in field operating expenditure could result, and that new gas field investment totalling almost £2bn, plus onshore generating plant investment of £3bn, could be delayed.

However, this study does not consider the potential consequences for the downstream part of the UK gas industry, the gas marketing and trading activities, where the widely predicted shake-out of players has begun to be seen.

## Retreat to the beach

First evidence was the demise of Bell Gas and the sale of Gas Direct to Shell (now called Shell Gas Direct). Various joint ventures have split up, including the BP Gas/Statoil/Norsk Hydro operation, Alliance Gas, Shell's venture with Esso, Quadrant Gas, the Conoco/ Powergen Kinetica operation, and the London/TOTAL Gas joint venture.

Of these, TOTAL Gas Marketing has withdrawn from the residential market and the up-stream co-venturers in the other three operations, Norsk Hydro, Exxon and Conoco, have taken part in what has come to be known as 'the retreat to the beach'.

By selling their gas wholesale at its landfall ('at the beach') on long-term contracts, these North Sea producers are creating a position with almost all the security of the old regime before the privatisation of British Gas. They still need to find a purchaser, but they do not need to concern themselves with the volatility and risks of trading, or with transportation, storage, and the intricacies – and costs – of the Network Code.

Texaco is poised to join these producers at the beach. Its downstream interest in its joint venture with Calor Gas, Calortex, and its commercial and industrial sector business are both up for sale. The closing down of another market channel could make the market more volatile and might drive more companies into retreat.

The power generators and regional electricity companies are also players in the gas market. A trend which can be Daniel Gas Chromatographs offer higher reliability, advanced technology and "out-of-box" startup.

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identified here is that of electricity companies moving their main focus to the domestic (residential) gas and electricity markets.

At the same time they are going through changes of ownership which represent the early stages of a general

	(bri cm)	Sshare
USA	75	16
Germany	70	14
Japan	60	12
Ukraine	40	9
Italy	35	8
France	33	7
Belovos	15	3
Belgium/Luxemb	13	3
Spain	13	3
S. Korea	10	3
Turkey	10	2
Other Countries	96	20

Total volume approx 470 bn cm

Table 1: International natural gas trade in 1997 – importing countries

move to fewer but multi-utility companies. This has so far been seen only in the commercial and industrial (C&I) gas market, but the same levels of shakeout in the domestic gas market are eventually expected to follow.

What will happen to the gas which is intended for gas-fired power plant projects that do not materialise? In some cases the planned gas will not materialise either as the gas field will not be developed, or it will be delayed. If it is already in production, it may be shut in.

The opening of a channel to Europe this month via the Interconnector might seem to provide the answer, but now is hardly an ideal time to export gas. European gas prices are very often indexed to the price of oil, which is currently very low. So the moratorium will not only reduce the opportunities for UK gas companies to sell gas, it will also diminish the price they can achieve for it.

The environmental benefits of gas for power have long been recognised and it is hard to see how the government will meet its emissions-reduction targets under the Kyoto agreement if coal-fired electricity generation is given the boost the government's review favours.

## European competition forges alliances

While we in the UK have been listening to the opening fanfares for the Interconnector pipeline, which links our market for the first time to continental Europe, it is easy to forget that only a week later another project, of arguably greater immediate significance to the Francophone gas world, also comes onstream.

The inauguration of the Norfra pipeline, which will carry gas from the Norwegian North Sea to Dunkerque (Dunkirk) in France is due to take place on 9 October 1998. By the year 2000 this line, the first direct link between the Norwegian North Sea and France, will be transporting a total of 15bn cm of gas per year to France. Of this, Gaz de France will deliver 6bn cm to Snam of Italy under a 25-year agreement.

This is a good example of the trends towards strategic alliances and innovative transit deals which have developed following the passing of the European Union (EU) Gas Directive in May this year. Another such trend is for gas companies without indigenous gas but with concerns over their security of supply to become involved in production joint ventures. The final new development, anticipating the widely forecast convergence in the gas and electricity markets, is for gas companies to become involved in electricity.

And everywhere there are new pipelines and network extensions to cope with the new transit plans. The next major pipeline to come onstream will be the 630-km long Europipe II, scheduled for 1 October 1999. Carrying 13.5bn cm of gas a year, as from 2001, from the Sleipner and Troll fields in the Norwegian North Sea. The gas has its initial landfall at Kårstø, Norway, then travels via the 42-inch diameter Europipe II to a landfall at Dornum, Germany, finally travelling 48 km on land to Emden, where gas will be delivered to customers in Germany, Austria and Holland.

Another major proposed line is the one tentatively labelled Interconnector II, under study by Gasunie of Holland. This would run from the Dutch coast to Bacton, where the original Interconnector has its terminal – and could possibly make a detour via one of the depleted gas reservoirs in the UK southern gas basin, to add some valuable storage flexibility. Gasunie says a decision on its study is due 'in three or four months'.

## Seizing the opportunity

Even given the national market differences, the alacrity with which countries will implement the Gas Directive varies markedly, as does the enthusiasm of individual companies for it.

One striking factor is the way in which some companies – such as Gaz de France and Ruhrgas of Germany – previously vocal opponents of market liberalisation, have become the quickest to see an opportunity rather than a challenge. Dr Klaus Liesen, Chairman of the Executive Board of the latter, said: 'Ruhrgas seizes the opportunities presented by competition. Only in this way can success in the past be continued in the future.'

In the same way, Russian gas from the Yamal pipeline can have access to Western European markets via the Ruhrgas network under a Gazprom–Ruhrgas agreement. Ruhrgas exports gas to Switzerland, the Czech Republic, Hungary, Austria and Liechtenstein.

Both Gaz de France and Ruhrgas are involved in strategic alliances. Both now have production of their own in the UK through stakes in the North Sea Elgin/Franklin gas fields – Ruhrgas since 1993, Gaz de France through recent deals with Elf and TOTAL – which they can transport through the Interconnector (where Ruhrgas is a 5% stakeholder) to market in Europe or trade in the UK.

Unlike Gaz de France, Ruhrgas already has gas-to-gas competition in its home market. Although the violence of the rhetoric used by each company about the other appears to have cooled a touch, Gazprom-BASF German joint venture Wingas is still intent on taking market share from the market leader. Maintaining its policy of concluding long-term supply contracts with regional or municipal utilities, Wingas reports that over the past year (to June) it has contracted for 12% of the German market.

Wingas Chairman Burkhard Genge has criticised Germany's plans to implement the EU Directive for failing to establish provision for TPA. 'An effective third-party access system should exist side by side with the right to lay one's own lines and use them as a competitive instrument.' Consequently the company is pursuing a strategy of investing in its own pipeline network,

	(bn cm)	%share
Russia	170	35
Canada	75	16
Algeria	45	10
Norway	40	9
Netherlands	35	7
Indonesia	33	7
Malaysia	15	4
Australia	10	2
Brunei	9	2
Abu Dhabi	8	2
Tuikmenistan	5	1
Other Countries	25	5

Total value approx 470 bn cm

Table 2: International natural gas trade in 1997 – exporting countries currently 1,400 km long, and in underground storage facilities.

The only hiccup in the plans of Gaz de France to profit from competition came when an innovative deal to swap a stake in the French distribution activities of Gaz de France for half of TOTAL's holding in the Norwegian North Sea Snohvit gas field was vetoed by the Norwegian authorities.

It was argued Gaz de France did not have sufficient upstream expertise, but clearly the presence of a gas buyer on both the buying and selling sides of the project might have weakened the sellers' position in negotiations. However, Gaz de France is in partnership with Norwegian state oil and gas company Statoil, along with Swedish power generator Sydkraft, to develop an experimental gas storage facility in Sweden in a cavern lined with steel.

#### Gas supplies for the future

**Norway:** The uncertainties of the Norwegian offshore regulatory system could have some impact on gas supplies for the future. Norway's share of gas deliveries to continental Europe is expected to rise from 14% in 1996 to 20% by 2005 and the country's gas sellers have committed themselves to delivering 75bn cm/y from soon after 2000.

However, Norway has declared an investment freeze on 12 oil and gas field developments due to go ahead this year. The intention is to cut 1998 investment by NKr 5.2bn and 1999 investment by NKr 11.5bn so as to dampen overheating in the oil services sector of the Norwegian economy. In addition, two gas-fired power plants



projects failed to go ahead when final approval was not forthcoming from Norway's pollution control authority.

Algeria: Despite continuing civil unrest, it is nevertheless pretty much business as usual for Sonatrach, Algeria's oil and gas company. Supplier of about 12% of Western Europe's gas, Sonatrach has completed the revamp of its LNG facilities and has begun marketing its joint venture with BP, In Salah gas.

The project to double gas export capacity through the Transmed line from Hassi R' Mel to Italy is continuing. Delivery of compressors for the GR1 and GR2 pipelines between the Alrar gas field, on the Libyan border, and Hassi R' Mel is scheduled for this month, under a contract with Nuovo Pignone of Italy. Hassi R' Mel is one of the world's largest gas fields, with proven reserves of about 86tn cf. Algeria intends to boost production there from 1.3bn cf/d to 7.3bn cf/d by the end of 1999.

**Russia:** Continuing political uncertainty in Russia must overshadow the celebrations this month of the 25th anniversary of the first Russian gas supplies to Germany. These contracts have now been extended and run till 2020, totalling 13mn cm/y on average by 2008, the conclusion point of the previous contracts. In 1997 Russian gas accounted for about one-third of Germany's supplies.

Some comfort for Russian customers must be gained from the fact that even through the difficult times of the collapse of the Soviet Union, Gazprom never defaulted on any of its European contracts. The more desperate the country becomes for hard currency, the less likely Gazprom is to do so. In fact, it may be seeking to sell even more gas to Europe, where payment is guaranteed, rather than to its markets in the FSU and its satellites, where it is not.

## **EU Gas Directive – the regulatory fromework**

The EU Gas Directive sets thresholds for the opening up of the national markets, largest gas users first. Those consumers who will first have the opportunity to contract for their own gas will be those whose consumption per site tops 25mn cm/y. After five years the threshold is lowered to those over 15mn cm/y and after 10 years to above 5mn cm/y.

At the same time, target minima are set for the proportion of each national market which will be opened to competition: 20% in the first stage, 28% in the second (by 2003) and 33% in the third (2008). The rules permit some exceptions, to take account of the state of development of the respective national markets.

For example, the 25mn cm/y threshold equates to 91% in Finland where gas is mainly used for power generation, to 47% in Belgium and to absolute zero in the less developed markets of Portugal and Greece, where there are no large industrial users. Portugal has only had gas since the start-up of Algerian deliveries through the Maghreb–Europe pipeline in 1997. The countries of the EU are far from unified in their position on the Directive, as reflects their different market circumstances:

- In France there is almost no gas-fired power, whereas in Finland that is its main use.
- The UK and Holland, largely self-sufficient in gas, are also exporters. Other countries, such as Belgium, import almost all the gas they use.
- Holland won exemption of production from 'unbundling' for accounting purposes and exclusion of production stocks from third party access (TPA) to distribution networks.
- Ireland, Spain and Sweden are concerned about unequal development of their gas markets in different regions.
- In the undeveloped markets of Portugal and Greece an investor might well require market protection before incurring heavy capital expenditure in infrastructure.



# **IP Week 1999: 15–18 February**

P Week in February is the focal point in Europe each year when leading figures in the oil and gas industry migrate to London for an intensive round of conference, industry and trade association events, company meetings and social functions. The Institute's own programme of events is the core of these activities. An influential programme of conferences appealing to an international audience has been planned, which together with the Annual Luncheon and Dinner, will form the core of IP Week 1999.

## Monday 15 February

IP Week

International Conference on **Financing the International Oil Industry - The Challenge** of Major Projects

The reduction in the crude oil price and financial uncertainties in Asian and other emerging markets have added new dimensions to the challenge faced by the oil industry and its bankers. This major international Conference will concentrate on the important issue of financing major projects, particularly those in areas of economic transition.

Speakers include: Stephen Hodge (Group Treasurer, Royal Dutch Shell Group), Philip Lambert (Director Global Head of Oil and Gas, Dresdner Kleinwort Benson), Kenichi Nakazato (General Manager, Bank of Tokyo-Mitsubishi), James Polin (Manager, **OPIC), Gunther Vowinckel** (Deputy Director, EBRD) and Peter Rigby (Head, Energy Group, Standard & Poor's).



Stephen Hodge

## **Tuesday 16 February**

Annual Luncheon 'The Century of Choice' **Guest of Honour and** Speaker Sir John Browne, **Chief Executive, British** Petroleum Company plc

The IP's Annual Luncheon at The Dorchester Hotel in London is one of the most popular events in IP Week. Sir John Browne, Chief Executive of British Petroleum Company will address guests at what we expect to be one of the highlights of IP Week 1999.



Sir John Browne

Wednesday 17 February

#### Crude Oil Pricing in **Deregulated Markets in Asia:** The 12th Oil Price Seminar

For details of exhibition and sponsorship opportuni-Supported by 100 ties, contact the

Conference Department.

New York Mercantile Exchange

## Wednesday 17 February

### The Annual Dinner

The Annual Dinner at the world famous Grosvenor House Hotel will be host to 1,500 of the world's senior oil executives. This year's speaker has not yet been announced but in keeping with the Dinner's tradition promises to be a senior figure in the international arena.

For full details and ticket application form, please see the inside back cover.



Overview of the 1998 Annual Dinner at the Grosvenor Ballroom

**Thursday 18 February** 

## International Conference on The Caspian Region: The Major Oil and Gas Play for the Next Decade

The development of the oil and gas industry in the countries surrounding the Caspian Sea will be one of the most important oil plays in the new millennium. This international Conference will address the key issues central to the development of this emerging oil and gas province.

Speakers include: Sir Malcolm Rifkind (Director of International Strategy, BHP Petroleum), Robert Priddle (Executive Director, International Energy Agency), Bruce Payne (Vice Presiden - FSU Project Finance, Chase Manhattan), EN Zana (Tengizchevroil) and Steve Remp (Chairman and Chief Executive, Ramco Energy).

For further information: The IP Week 1999 Programme will be available in mid-October. Please contact the Conference Department to add your name to the mailing list. Pauline Ashby, Conference Department, Institute of Petroleum, 61 New Cavendish Street, London W1 M 8AR, UK. Tel: +44 (0) 171 467 7100 Fax: +44 (0)171 255 1472 e-mail: pashby@petroleum.co.uk

# **IP Lifetime Learning initiatives**

Lifetime Learning refers to the ongoing process by which an individual acquires a unique portfolio of skills, knowledge and understanding during his or her working career after leaving full-time formal education. The IP announced its commitment to becoming 'a learning society' early in 1997, and has been pursuing 12 key projects as the basis of this since that time.

Many of you will still not have become familiar with this new IP initiative and it is hoped that this special Lifetime Learning feature will help to raise awareness of this new approach. The IP's interest in this area is very much in line with current UK Government thinking about the ongoing need to re-train and re-skill throughout our working lives - the emphasis on what it calls 'Lifelong Learning'.



he UK Government has a vision of a Learning Age. The proposals are:

- To expand further and higher education by 2002.
- To create the 'University for Industry' which will use information technology to make learning available at work, in learning centres, in the community and at home.
- To provide information about learning opportunities through a freephone helpline - Learning Direct.
- To set up individual learning accounts linked to smart cards for individuals to save specifically for learning and to have the means to record it.
- Investing in young people, through various schemes, so that more continue to study beyond the age of 16.
- To intensify the help for the unemployed through 'New Deal' - a plan to increase basic literacy and numeracy.
- To widen access to learning in further, higher and adult education.
- To tackle skills shortages through the new National Skills Task Force.
- Stimulate the Training and Enterprise Council to have an integrated plan for local workforce development.



- Set and publish targets for national skills and qualifications.
- Work with business to support and develop skills in the workplace.
- Raise the quality/standards across teaching and learning.
- To build a qualification system which is easily understood, values both academic and vocational learning, meets employers' and individuals' needs, and promotes the highest standards.

The aim is to help put in place the infrastructure which will help to foster a nation of enquiring minds and a love of learning. The foundations of a thirst for

#### learning, and proactive, personal development need to be laid down at an early age. In other words, the seeds need to be sown with school children who should then (more naturally) embrace a life style of continual change by developing their skills and knowledge throughout life. If the government's plans come to fruition, then it seems logical that a new learning culture could be developed. Starting out with good habits is always helpful. A good analogy is watching swimmers you can always tell the ones who have been taught correctly at a young age the style says it all ....

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## Workbook and Plan

The IP Lifetime Learning initiative was launched to the membership in a supplement to this journal in February of this year. This included unveiling the IP Lifetime Learning Workbook and Plan and, since that time, some 180 individual members have asked for their personal copy and are evaluating it as a basis for their own development. Many are now using it as the distinctive model for the forward management of their own careers (see p24 for information).

While this number seems small in comparison with the totality of IP membership, many members will already participate in corporate schemes providing alternative frameworks or the Continuous Professional Development schemes of other bodies of which they are members.

### **Corporate members**

The IP Lifetime Learning Workbook and Plan has been extensively promoted to the Corporate Members of the Institute, ranging from major oil companies to small and medium size enterprises. A number of companies are now evaluating the model to see whether it could be incorporated into their own employee development schemes, while others have acknowledged its value in parallel with what they are currently doing.

Conoco UK Ltd asked for IP participation in ITS employee learning awareness days held in September. The IP's approach to Lifetime Learning perfectly reflects the Conoco view that individuals must take responsibility for their own personal development. Brown & Root, and the Qatar Petroleum Corporation, are among other companies currently evaluating the IP model. Many Corporate Members have not yet had the time to consider the IP's approach and it is anticipated that interest will increase as awareness is raised.

## Lifetime Learning latest developments

## **Rapid progress over last 18 months**

John Evans, Membership Services Director of the Institute of Petroleum, comments on progress in implementation of the initiative.

mazing progress has been made in the 18 months since we took the decision to develop this process. Of the 12 original projects we identified, 10 are fully up and running; one we have dropped because we decided it is impractical, one we are working on but progress has been slowed because it involves the new National Training Organisations and they have taken time to emerge. Most importantly, we added an additional one, which was the development of our own IP Lifetime Learning Plan and Workbook, and this we launched early this year. We see this as the essential framework for the whole scheme, and are focusing a great deal of attention on it.

The uptake of the Plan is reported elsewhere in this feature and the numbers seem modest. However it has to be understood that many people are involved in personal development plans provided either by their employers or by other professional organisations.

'Secondly, on the corporate side, companies will take a long time to think about these ideas before they adopt anything. Thirdly, and perhaps most importantly, the concept of Lifetime Learning is not an easy one to grasp. It involves a cultural change from corporate or professional-body driven prescriptive systems to an individually-led voluntary and personally pro-active approach.

'The concept of learning, per se, is not well understood either. Most people still think uniquely of formal training as the key process for their development, whereas the IP's approach to Lifetime Learning stresses that personal development comes from developing competencies through a range of different "learning experiences".

'These include formal training but also encompass personal study, work on the job, participation in peer groups such as specialised technical committees, attendance at lectures, seminars and conferences, and ultimately access to freely-available information, for example through our Library and Information Service and of increasing importance on our website.

Lifetime Learning is by definition a very long-term process and its promotion may take several years before it is fully understood by the bulk of our membership and the ideas and concepts are widely adopted. We are devoting substantial resources to the "marketing" of the Lifetime Learning concept to both individuals and corporate members, by mailings, through features like this one and by a series of presentations to Branches as well as developing a workshop. We are even



looking at how IT can be used to further spread the message. We expect to continue to do so. It will be a long haul. This is not a "programme" that will shortly be replaced by another one. It is a long-term commitment. As the uptake increases we will be looking to develop further support services for the benefit of members that are committed to it.'

## **One-day workshop**

As part of the process of widening understanding about Lifetime Learning, and illustrating how the IP can help individuals and companies in self-managed personal development, the IP is generating a one-day workshop which it is envisaged can be customised to meet the needs of different groups. These may include:

- Specific companies which have expressed an interest in using the Lifetime Learning model.
- 'Champions', eg representatives from Branches who might be talking to companies and individuals about Lifetime Learning and needing to understand it better.
- Groups of individual members who want to know about Lifetime Learning.
- Company or professional groupings who have an interest in the matter.

It is already planned to run an event jointly with the Crine Network and OPITO for line managers and HR advisers within the offshore petroleum sector, in conjunction with the Crine Conference in Aberdeen early next year.

This first event will include presentations putting Lifetime Learning into the national context, reflecting the government's 'lifelong learning' agenda, a review of the challenges which face this sector of the industry, and a practical framework and guidelines to assist companies to link their company learning and development initiatives to business performance objectives.

These will supplement an overview of the IP's approach to Lifetime Learning, an explanation of the IP's Lifetime Learning Workbook and Plan, and a casestudy which will demonstrate best practice in a company with a 'learning culture'.

Look out for further news about this, and other events of this type, in Petroleum Review.

## **Confessions of an individual member**

he IP Lifetime Learning programme gives individual members a different slant on their control of their own career and life. The IP has recognised that in addition to the Continuous Development Programmes by promoted the Professional Institutions (Member - Chartered -Fellow etc), there is a need for members to look after their own lives and career options within the industry, irrespective of the profession they are involved in. Peter Haar, Senior Consultant at KBC - an international consultancy specialising in refinery optimisation - has used the IP's Lifetime Learning Workbook and Lifetime Learning Plan to check on his personal progress in the part of his career that he can control. He writes:

workbook gives excellent guid-The ance through a very personal and soul searching set of questions. These should be taken seriously. Unless you really want to hear the answers to a lot of the guestions that may be in your mind (and you are brave enough to face them) you should not work through them. Take control of your Continuous Personal Development (CPD) as well as your Continuous Professional Development (CPD ...again). Both CPD phrases are embodied in the IP's Lifetime Learning Principle and the Workbook will help you through it.

'Am I doing the right thing in my career?' 'Is there an alternative in which I would be happier/healthier/richer/more fulfilled?' 'What would I want to do differently that would make my life better?' All these questions have come to mind at various stages in my life. I do not believe that this is different for anyone, whether they are 8 or 80 years of age.

### A personal experience

I would like to share my experience of working through the Workbook with those members who have not tried it yet. It took me six hours to work through it, the first time I have assessed myself since I graduated 13 years ago!

Self assessment is a very personal and private thing. It should only be done for yourself and not for anyone else or to prove a point. You may not want to share your Lifetime Learning Plan with your colleagues or your employer if you fill it in honestly. For me it confirmed the reasons why I left my last employer to pursue a career that suited me better.

You have to focus on where you are now, what you want to do, what your have to do to get there, and what you can influence in your life to do so. Most importantly – BE HONEST AND REAL-ISTIC IN YOUR EXPECTATIONS! But also remember that 'The sky is the limit'.

It may be difficult to be brutally honest with yourself – especially when you are doing the self assessment part of the workbook. It is easy to write down what you would like to think your are capable of... until you have to show some evidence of actually being able to do it. When I filled in my workbook I noticed that my views on risk versus reward, ability and drive versus my ex-employer's view of ability and drive were very different. The goals I set myself in Exercise 3 of the Workbook seemed realistic, but I am sure that my horizons will change over the next few years and that I will revisit my goals. The Lifetime Learning principle does allow for continuous improvement and resetting of goals and targets.

## Striking a balance

Having set yourself some realistic goals for the next few years the Workbook asks you to define your ideal job. 'Being at home with your employer paying you a lot of money for nothing' was what I wanted to fill in... but to be realistic that was not going to happen. My norms and values will change over the years hence my ideal job will change. The Workbook helps you through 'striking a balance' between career expectations and real life expectations. It helps you identify what you really want, not what your partner, employer or the community around you want. All these factors are involved in your career and will steer your decisions but you have to decide what you will do about your career. I think you have to work to live, not live to work and the book allowed me to articulate what was important in my life.

Having assessed my own skills, goals in life and striking a balance between life and work, the Workbook steers you through setting some objectives. These objectives can easily become a 'wish-list', so you have to keep asking the question 'Can I make this happen, without relying on my employer or others to do this for me?'

The most useful part of the Lifetime Learning Workbook is the very last section which allows you to look at your personal learning opportunities in your current job. It is the best guide I've used – one to refer to quarterly or whenever your current job makes you feel bad.

## **UKOOA Reputation Education Group**

The group came together for the first time in February 1998 As part of UKOOA's ongoing programme of reputation management, a strategic objective is to: 'engage with young people and those who influence them by investing in a partnership with education so as to contribute to a greater accurate awareness of the industry.'

The REG group has met regularly and a number of projects are underway.

The project which has just come to fruition is the National Network of Science Clubs BAYS 'Visions for the Future' Competition, culminating in presentations at the British Association Annual Festival of Science at Cardiff University 10-11 September.

Visions for the Future of North Sea oil and gas was a competition open to all secondary schools and sixth form colleges in the UK. The task was that a school team was asked to produce an information package that looked at the issues surrounding 'North Sea oil and gas – improving the future'. The package could take the form of: A written document

- A video report
- A radio audio report

Of the entries the four projects were chosen by a panel comprising BAYS, UKOOA and IP.

Thirty-two 16 to 18 year olds from secondary schools in England, Scotland and Wales won their places at the conference organised by the British Association for the Advancement of Science with sponsors from the UK offshore oil and gas industry through UKOOA.

During the two-day conference the young delegates interacted with scientists and engineers, including leading industry representatives, through a programme of presentations, debates and question and answer sessions.

The students prepared their responses in workshop sessions and discussion groups before presenting their own visions for the future of oil and gas to an invited audience of scientist, academics, industry representatives and the media.

# The CRINE Network Education and Training Group and Lifetime Learning

The Mission of the Education Steering Group states:

'The success of this changing oil and gas industry demands a greater emphasis on the continuous development of individuals. This group will make a difference by creating a compelling model to deliver this.'

CRINE Network established an Education and Training Work Group in March 1997. This group is planned to continue in an advisory capacity to support specific initiatives and deliverables related to education, training and skills development to the benefit of the UK upstream oil and gas industry. The decision was taken to establish a pan-industry approach for workforce skills and competence development supported by OPITO as the National Training Organisation for oil and gas extraction

The objectives were to establish a framework, which provides the industry, the company and the individual with opportunities and resources to develop and enhance appropriate skills, knowledge, and experience.

- This will be carried forward through:
- An adapted tender process (to encourage investment in learning and development) to ensure commitment and fairness throughout the industry.
- Pan-industry guidelines which all companies can support.
- A learning log to be used by individuals for planning their development and demonstrating their achievement.

This has been endorsed by the Skills Forum and UKOOA Operations and Technical Committee.

This work will now be taken forward, led by OPITO and steered by the CRINE Group, and it is now close to a decision to adopt the IP's Lifetime Learning Workbook and Plan as the core of the 'learning log' for development of staff in their sector of the industry.

## Key information to be found on the IP website

## includes

- News in Brief Service updated daily the latest developments, deals and contracts in the oil and gas industry around the globe. Chronological listing from January 1997 to date
- 30 new information sheets containing useful addresses and data
- Hot-links to over 200 relevant oil and gas industry sites
- 'What's On at the IP' and 'Around the Branches', over 250 pages of data and information about the IP and industry activities, full details of IP publications and conferences
- Directory of 64 IP Corporate Members with details of their organisations and activities

The IP web site – the first step in any data search

## www.petroleum.co.uk

Lifetime Learning

## Unlocking employees' capabilities, creativity and knowledge

In late 1996, Brown & Root, as part of a wider programme to develop the capabilities of its staff, introduced a voluntary mentoring programme for the 500 staff in its Energy Services Division.

**Clutterbuck Palmer** 

Schneider (CPS) was

appointed consultant and

by March 1998 around 300

mentees and 70 mentors

had been trained. The

following is a shortened

version of a paper

presented by Alan Black

of Brown & Root, and

Jenny Sweeny and

Madeleine Brewster of

CPS, to the 4th European

Mentoring Conference

held in London on

this continuing and

developing mentoring programme. Until recently Brown & Root Energy Services' main business was the provision of design engineering, project management, procurement, fabrication and construction services to the oil and gas industry. Our clients, the major oil companies, have undergone major downsizing and consequently they are expecting companies like Brown & Root to provide many more services which they used to support themselves, such as field development, operations and maintenance. In addition, Brown & Root is using its own funds to invest in its own energy assets.

All of these changes, and the breakthrough profits promised, make more demands on our staff and require them to have new skills.

In order to help realise such a breakthrough, a massive change in our culture will be necessary and we must harness the full potential of our employees. They must be allowed to develop this potential and to express their individual creativity for the benefit of themselves and Brown & Root.

Mentoring is one of the major initiatives designed to support this process.

By redefining the Adair Leadership model we have invented a performance management system which focuses on the task, a peer group system which focuses on building teamwork and a mentoring system which focuses on the individual.

Mentoring is intended to encourage everyone to take responsibility for their own learning and development in the acquisition of new technical and behavioural skills. Without this step change into a 'learning organisation' our future vision will not be realised.

Our purpose statement for the scheme reflects this:

'Mentoring will specifically address the needs of the individual by supporting and enabling them to take responsibility for their own development, in order to:

maximise their potential;

- change attitudes to encourage active commitment to personal and career development;
- attract, retain and motivate individuals; and
- create a flexible and high performance workforce.'

The commitment of the team of four Engineering Group managers, as the

senior line managers in the Engineering Services Group, has been crucial to the initiation and sustaining of the scheme, and this has required, and continues to require, a significant investment of time and energy. We have all been trained as mentors and are actively fulfilling the role, are members of the mentoring steering group and have project managed the implementation.

## **Phased programme**

The scheme is being rolled out in a series of 'tranches' of 20 mentors and 80 mentees. Mentors are drawn from the senior professional engineers in the company. Initially they came from within Energy Services, but as mentoring became known they were attracted from sister parts of the organisation – Civil Engineering, Project Management and non-engineers from Human Resources and Finance. Criteria were established with evidence statements for each one. These were based on generic criteria from the Mentoring Diagnostic, a tool developed by David Clutterbuck of CPS.

The six criteria are:

- high quality experience in Brown & Root and/or the industry;
- credible;
- interested in the development of others;

interested in their own development;

has bought into the new culture; and

sound interpersonal skills.

Names are put forward by members of the steering committee and at least two members must strongly recommend the individual, particularly with regard to their interpersonal and development skills. Mentors are approached but can choose not to participate.

Unlike traditional mentoring schemes, which focus on a specific group with a specific timescale (such as graduates or those on a development scheme for two years or the length of the course), Brown & Root has introduced an 'open door' scheme available to anyone who wants to participate.

Mentoring is offered to all permanent employees in Engineering Services, except graduates who have their own scheme which focuses on supporting them through their Institute's professional accreditation programme.

Participation is entirely voluntary. Mentees therefore demonstrate a wide Lifetime Learning

span in age, attitude and expectations and in commitment to the organisation or the scheme.

The incidence of open door schemes is growing. However, they raise new issues for which some schemes may be unprepared. The prime one is around the purpose for which the individuals meet, the goal of the discussions.

Most traditional schemes have a stated focus, such as graduate induction or support for a development scheme, where the overall goal is set extraneously, even though each individual situation may differ to a degree.

In an 'open door' scheme the goal needs to be set entirely by the individual partnership. While some mentees, often the younger ones, have a clear goal, for others this is more difficult to define. We regularly heard: 'I don't have a problem so I don't need a mentor'.

For these pairs we encourage the concept of a long-term relationship, building and maintaining a level of understanding in the partnership by occasional meetings, so that as issues arise there is a basis of trust on which to work.

For the pilot, mentees came from one core skill group in Engineering Services so they mostly know each other even if they did not work together. Having experimented with a random selection of mentees across the organisation we are now convinced that schemes of this size will be easier to sustain working with groups of mentees of the same core skill, who are able to easily share their mentoring experiences back in the workplace.

## **Matching pairs**

Mentors and mentees at Brown & Root are all experienced people with knowledge of the business and views of their own. When it came to matching there needed to be choice in the pairing process. We devised a process whereby mentees select three people they feel they could work with from a group of about 20 trained mentors. The steering group pair mentee with mentor from this information.

To avoid the 'cherry picking' syndrome – high demand for the most senior and visible people, the training for mentees focuses strongly on identifying the characteristics in the mentor that will be important for each individual – personal characteristics, business background, job level and location.

Choice is aided by a one-side A4 autobiographical pen portrait of each mentor, a key outcome of the mentor training. Mentors are encouraged to write in their own style to reflect their personality.

In addition, they are invited to the mentee training workshops. There is an opportunity to talk informally over lunch but then an hour is set aside for one-to-one conversations when most mentees are able to talk to three mentors.

This process has a double benefit: mentees feel more involved and able to make an informed choice while, for mentors, the whole scheme comes alive and commitment is high.

## Training

CPS research shows that schemes are three times more likely to succeed if mentors are trained. We also believe that for a partnership to stand on an equal footing, mentees should receive training. In the case of Brown & Root, where we were introducing a major organisation and culture change, training was essential.

The objective of initial training for mentors is not mastery of all the skills and behaviours used in mentoring. Rather it is to equip people with the confidence to begin the relationship, the insight to recognise how it should be managed and the tools to identify where the relationship is being least effective, and to take action.

For mentees, the aim is an understanding of what they can expect from the relationship and the responsibility they have to make it a success. The key message to put across to both is that the primary aim of mentoring is to create self reliance for the mentee.

Mentor and mentee training follows a similar pattern – to establish a common basis of understanding – but is in greater depth for mentors and includes a significant one-to-one skills element. Mentor training lasts for two days, mentee training for one. Common elements are:

the business case for mentoring;

- the mentoring approach;
- ground rules for the Brown & Root scheme;
- managing the relationship;
- the life cycle of a mentoring partnership;
- the mentor's role;
- how people learn in business;
- self managed learning;
- career development; and
- the matching process.

### Mentor support

Where mentoring schemes are well researched and planned, implementation is generally successful. What proves more difficult is sustaining the schemes. This appeared a mighty challenge for Brown & Root with a large number of participants while the open door nature of the programme gives it a more diffuse focus.

CPS believes that while mentees drive the individual partnerships, committed mentors provide the drive and energy to sustain the scheme as a whole. With all our schemes we recommend bringing mentors together after four months for a half-day session to discuss common issues.

At Brown & Root, we use the regular review session at four months after each tranche to look at:

- mentors' perceptions of how the relationships are working;
- any problems they might have;
- how well the initial workshop prepared them to effectively manage the relationships; and
- any skill areas with which they need further help.

We have built on these sessions to set up regular quarterly half-day workshops. Part of the time is spent swapping news, ideas and sharing problems. The balance is used to strengthen mentor skills and techniques.

Through these sessions, we are establishing a clearer idea of the problems mentors encounter as they develop relationships. Among the modules developed to support them are:

- direction setting;
- one-to-one skills; and
- career development.

Direction setting This is the second of four stages that CPS identifies in the life cycle of a mentor relationship. It moves the pair from the warm fuzzy 'rapport building' to the more focused stage of achievement. As has been noted, in an 'open door' scheme, the pair have to set their own agenda.

We have identified three patterns so far: (1) The mentee has a clear goal, often true of younger staff.

(2) The mentee reassesses self/career/ role and defines a new goal.

(3) The mentee feels no immediate need and the relationship is quiescent or offers an 'open space' for discussion.

It is important to recognise that status (3) is not a failure provided it is arrived at deliberately.

But how do pairs establish which pattern is appropriate for each relationship rather than drift into it by default?

We provide some questioning formats which mentors can use to encourage individuals to probe for latent goals. By identifying the three patterns, we have made different end points permissible – there is no 'right' situation.

One-to-one skills Mentors find it difficult to cast off the manager role for the more responsive role of the mentor and mentees are often willing to let them take the lead. A frequent plea is 'How do I get them to talk?' The answer 'Don't talk so much yourself, ask questions', proves difficult to implement. As a consequence we run regular refresher sessions on listening and questioning using all the techniques available.

Career development Given the changing pattern of work, old career paths are moribund. In Brown & Root, as in most organisations, people need to manage their own careers. This is a culture change as much for mentors as mentees. Career development workshops look at:

- the changing shape of work and careers;
- career families and career maps in Brown & Root; and
- signposting information about career options in the business.

As senior professionals, mentors have great insight into the direction the company is taking, the new opportunities arising and the need for new skills. Collectively they form a powerful information source. But they are not aware of this. We are capitalising on this by two further support mechanisms: a monthly mentors' lunch, entirely for information exchange, and a mentors' website.

Mentors are seen to be key in sustaining the mentoring scheme in Brown & Root. These support methods are intended not only to strengthen their capability but also to offer them the personal benefit of an influential network.

### Scheme management

With a scheme of this scale and scope, it has been crucial to ensure that it is managed effectively and efficiently throughout the implementation phase, and that it can be sustained afterwards on an on-going basis.

To achieve this, we have moved beyond the traditional idea of a sole mentor scheme coordinator, to put in place a simple, enabling structure with clear roles and responsibilities. This is evolving as the scheme evolves. There are three key roles – the steering group, tranche manager and mentor coordinator. The steering group's responsibilities are as follows:

- managing the interfaces with other organisational initiatives;
- communicating the reasons for the scheme and marketing the benefits to key groups within the organisation; and
- evaluating the scheme on an ongoing basis and sharing the lessons learnt with other groups interested in introducing mentoring.

Each tranche has a tranche manager, usually a group manager, who is responsible for the project management of the tranche over a four-month period. Project management includes resourcing the tranche with mentors and mentees, organising the training, facilitation of the matching process, and the initial evaluation of the tranche. We have written a set of guidelines on how to project manage a tranche to clarify the role of the tranche manager and other key players, and to ensure the following: that each tranche is project managed in an effective, efficient and timely way; that a consistent approach is adopted and the established framework for mentoring maintained; that the process of project management continues to be monitored and evaluated, and lessons learnt implemented; in essence, to maximise the potential, and maintain the momentum of the scheme.

A mentor coordinator identifies himor herself from each new group of mentors. As a tranche manager completes the implementation of his or her tranche they hand over responsibility for the on-going coordination and support of the 20 mentors and 80 mentees to the mentor coordinator.

In providing support in three key areas, the mentor coordinator role has been, and is, pivotal to successfully sustaining and maintaining the scheme. These three areas are:

- Providing personal support to their group of mentors, which includes the organisation of quarterly workshops to discuss experiences and lessons learnt, and to provide further training to support the mentors in developing their role.
- Facilitating the matching of mentors and mentees either for reasons of relationship breakdown or for new starters.
- Resourcing the training of additional mentors and new mentees.

Once the implementation of the scheme is complete in 1998, a steering group of group managers will continue to have a strategic overseeing role. However, the focus of activity will move to the mentor coordinators and representatives from Learning Development and Human Resources, who, as a team, will have responsibility for the ongoing management of the scheme. In this way, we will be devolving the responsibility for maintaining the scheme to those most actively involved.

#### Success criteria

A 'balanced score-card' has been used as the principal methodology to assist in the defining of success criteria for the scheme and the evaluation strategy. Such an approach requires that the success criteria are derived from a number of different perspectives, and that the evaluation strategy uses both qualitative and quantitative techniques and measures.

The balanced score-card was used to

summarise feedback from the evaluation process in order to provide an overall picture of the progress of the mentoring initiative and to inform subsequent planning of further tranches of the scheme. In addition to reviewing the scheme at an organisational level, mentors and mentees are also given checklists with which to review their own individual relationships – for example, to help in the setting and review of ground rules for the partnership and to assist with open and regular reveiws to see whether, and how, their relationships are developing.

This review and evaluation process has helped sustain the scheme, focusing peoples' thoughts on the status of their relationships and spurring them to action.

### Level of take-up

How far are people throughout Brown & Root committed to mentoring? What percentage of successful relationships should we expect? What is success?

Again, with any traditional scheme, sharp focused and time limited, success rates of 70% could be expected. For an 'open door' scheme such as this, there are few precedents, but we believe, realistically, that the number of active pairings will be lower. We are now able to draw a distinction between nona quiescent participation and relationship, where the partnership is established but currently non-active. These are important distinctions, particularly for mentors, who are concerned to measure their 'success'.

Brown & Root started the first one-year evaluation with the pilot group in November 1997. Feedback from the threemonthly focus groups has been grouped under four key themes and shows that mentoring is (a) creating a focus on career, professional, and personnal development and is a catalyst for action; (b) providing different and broader perspectives on the company and a source of information about the company; (c) expanding networks, and; (d) an opportunity for reflection with a good listener.

Results from the questionnaire indicate that one in five mentoring pairings are not being initiated or are stalling after the first meeting; up to one in two mentoring relationships are 'active' in that the partnerships are meeting regularly; and one in three relationships have established rapport and are meeting as and when issues arise for the mentee.

The focus for discussions in the mentoring meetings is emerging as primarily one of development: personal, professional and career development, with this focus strengthening as the implementation of the initiative progresses, as demonstrated by the level of usage of development planning techniques.

# Changing patterns of risks in exploration and production

The nature and magnitude of the geopolitical risks facing oil and gas companies in their global operations is constantly changing and evolving. In the first of a series of articles examining the risks companies currently face, Gordon Cope describes how some UK petroleum companies are dealing with the challenges, and notes some of the major new wrinkles in an old game.

ew areas have opened up to exploration and production (E&P) companies due to a worldwide trend toward privatisation of national oil companies and liberalisation of investment legislation,' says Bob Johnson, Director of JFA Global Ltd, an international upstream energy consultancy. This has led to many North American and European companies expanding beyond their traditional backyards.'

However, companies entering the international field for the first time are discovering that the game is played by different rules. When a field geologist for an American independent oil company handed over his passport at the Azerbaijan border, he got a nasty surprise when he tried to get it back.

'That will cost you US\$20,' announced the border guard.

'For what?' asked the perplexed geologist.

'Passport tax.'

'l want an official receipt,' he demanded.

'That will cost you another US\$60.'

Anyone who has ever chased a gas play in southeast Asia or built an oil refinery in Africa has a wealth of similar tales to tell. But international explorers now face a whole new spectrum of risks that go far beyond petty corruption. 'When I was in Colombia during the 1960s, I loved it,' says Richard Hardman, Vice-President of Exploration at Amerada Hess International. 'I took the bus everywhere and never worried.'

Unfortunately, criminal gangs and terrorists in Colombia now target oil executives for kidnap and ransom. When Amerada Hess currently considers a new country to invest in, it not only looks at the geology, the legal framework and the ability to generate a profit, but also the impact on the company's reputation and physical risk to its employees. 'A country has to pass all those hurdles,' says Hardman.

### Sanctions and public pressure

International sanctions that prevent investment in pariah countries are also a growing problem. A recent report in the *International Herald Tribune* noted that over 60 laws or executive orders authorising sanctions are currently in effect in the US alone.

Public pressure generated against companies by non-government organi-

sations, or NGOs, is also a major concern. 'In the past, NGOs concentrated on government agencies – now they focus more on commercial organisations,' says John Bray, a Principle Researcher with Control Risks Group Limited. 'Commercial companies are easier to influence and the NGOs believe that, in practice, they may have more impact on host governments.'

Premier Oil, a UK-based independent involved in the \$650mn development of Burma's Yetagun gas field, has firsthand experience with NGOs. 'We are under considerable scrutiny from human rights groups and governments,' says Charles Jamieson, Chief Executive of Premier. 'I spend quite a lot of time communicating our health, safety and environmental policies.'

### Assessing risks

According to Johnson, the major geopolitical risks that oil companies should be aware of in the late 1990s include: timing (when to get into a play and how long it will take to get payback); access (how difficult it is to get an E&P licence); export (essentially the ease of converting production into an international currency); international sanctions; political risk; sanctity-of-contract; corruption, civil stability; and public opinion.

When advising a client interested in exploring internationally, Johnson breaks the world down into clusters of regions and/or political systems which have varying opportunities and risks. 'Canada, the US, the North Sea and Australia form a distinct category,' he notes. 'They are conventional risk areas with low technical and political risks, high competition, and free and open access.'

The main drawback to the category is that these areas only offer limited exploration opportunities. 'It's good for the small fry, but there's nothing new for the big guys.'

On the other hand, the region of North Africa – including Egypt, Libya, Algeria and Tunisia – offers bigger game, but also more significant risks. Libya is under US-led sanctions after the 1988 bombing of the Pan-Am flight over Lockerbie, Scotland. Algeria is in the grip of a brutal civil war that has claimed the lives of thousands of civilians.

Yet, according to Johnson, there are also unique opportunities. 'Much of the oil found in this region relied on 1970s technology and skills. When you apply late 1980s and 1990s technology to plays, you can find a lot more. Anadarko in Algeria applied a team approach by combining key seismic, sedimentological and structure skills developed in its US Gulf Coast E&P activities, and has taken a lead position in the finding of 2bn to 4bn barrels of new oil in the Berkine Basin.'

Libya represents a similar opportunity, not only due to the 1970s-level of exploration technology, but because the US oil companies, well-known as fierce competitors, are not allowed to participate.

In Algeria, civil unrest has led to terrorist death threats to foreign and domestic oil workers, but the E&P areas are isolated in the southern desert. 'Operating companies fly their employees directly to the oil fields, avoiding Algiers,' says Johnson.

West Africa - including Nigeria, Gabon and Angola - has a different mix of risks to confound the opportunities. The chances of finding untapped giant fields in the Angola/Cabinda deepwater area are good, for instance, but the country has a long history of internal strife. 'Angola has had a civil war for the last 25 years, but virtually all its oil resources are offshore, and away from the hostilities,' notes Johnson. 'Timing and export are not a problem here, but acreage accessibility is. For most companies, entry is difficult. Rig availability is a factor and initial costs are high, with a single deepwater well costing \$20mn or more. This is a play for the big boys."

Nigeria, which dominates this region with huge natural resources, is a tangle of risks. After the arrest, conviction and execution of opposition leader Ken Saro-Wiwa, international human rights groups focused condemnation on the military regime and Shell International, a major oil operator in Nigeria. The recent demise of Nigerian dictator General Abacha, and the subsequent death of deposed President-Elect Chief Abiola, have worsened the civil unrest. Finally, corruption is so endemic in Nigerian society that little in the way of commerce can be conducted without recourse to bribery. 'We passed on Nigeria,' says Hardman. 'It is a country we seriously looked at, and wouldn't take it. The framework of law is good, but we didn't want to risk our reputation.'

Johnson admits that, in his experience, most boards of directors shy away from Nigeria because of scams, fraud and corruption. 'But timing, access and export are not a problem,' he notes. 'There are lots of opportunities. Nigeria wants to invite new companies in. There is potential for growth.'

As for the negative public opinion that Shell experienced, Johnson notes that Elf has access to a similar volume of oil in Nigeria, and nobody blasts them. There are 11 majors operating in Nigeria and eight smaller E&P companies working with indigenous explorers or producers. Most companies won't suffer like Shell.'

Even if the political climate eventually improves, oil companies worry that corruption will remain. According to the experts, there are three distinct types of corruption: minor bureaucrats who want their palms greased to expedite business; con artists; and the 'Swiss bank account'.

A small cash payoff to a government official, to get the electricity connected to a warehouse, for example, is very common. 'We don't do this, but some companies have an agent whose job it is to perform certain functions – he is a fixer,' says Hardman. 'You arrive at an airport and he meets you there to walk you straight through customs. You don't ask how it's done.'

For those companies with policies that prohibit fixers, Johnson notes that it is still possible to work in Nigeria. 'You just have to be willing to accept delays.'

The con artist who comes along pretending to be a legitimate businessman typically says that his brother-in-law, the Minister of whatever, can make the red tape less onerous. According to Johnson, there is a reasonably effective method of eliminating shysters from legitimate middlemen. 'You break them out by cross-referencing their credentials.' A word in the right ear does the rest; many

Rank	Country	Oil reserves (bn barrels)
1	Angola	4.86
2	Algeria	3.39
3	Brazil	1.96
4	Saudi Arabia	1.86
5	Nigeria	1.77
Double.	Country	Gas reserver
мапк	country	(bn cf)
напк	Indonesia	(bn cf) 36.3
напк 1 2	Indonesia Iran	(bn cf) 36.3 25.8
напк 1 2 3	Indonesia Iran Norway	(bn cf) 36.3 25.8 18.7
1 2 3 4	Indonesia Iran Norway Egypt	(bn cf) 36.3 25.8 18.7 17.3

Top five exploration 'hot-spots' by oil and gas reserves added in 1993–97

countries take a dim view of con artists who make false representations regarding government relationships.

Senior officials who want large sums secretly deposited in a Swiss bank account present the most serious problem; the OECD has just signed a convention that will make payment of such bribes a criminal offence. 'If a government says: "Deposit x dollars into a Swiss bank account", then you must formalise it as a form of tax with the government,' says Johnson. 'That way you don't run afoul of international regulations. But if an individual asks you for it, then you must say "no deal" and walk away, or it will come back and haunt you someday.'

South America, including Venezuela, Colombia, Brazil and Peru, used to be considered a high risk region due to the threat of nationalisation, but the global trends toward privatisation and liberalisation have created tremendous opportunities.

Venezuela's recent decision to privatise its conventional and heavy oil reserves has attracted many companies eager to get their hands on large material reserves close to the American market. While Johnson notes there are no problems with sanctity of contract or export, in his opinion, companies can run



risk management

the risk of paying too much for reserves. 'There was a feeding frenzy, and some companies put too much on the table.'

In Colombia, the tremendous growth in petroleum reserves in the last decade is balanced against the risk to employees. 'Terrorist groups are very sophisticated,' says Johnson. 'They know how to play their cards. They blow up pipelines, they kidnap employees for ransom, and they are selective in how they extort money.'

While Johnson notes that many smaller companies are active in Colombia, it isn't everyone's cup of tea. 'I recommend to those companies that are concerned about safety of their employees to look at Brazil or other Latin American countries as E&P investment options.'

The Caspian Sea, bordered by Kazakhstan, Turkmenistan, Iran and Azerbaijan, presents a tantalising exploration target. 'The political risk is going down, but many companies shied away from the Caspian in the early to mid 1990s because there was no clear export route,' says Johnson. 'The cheapest way to get Caspian oil and gas out would be through Iran to the Gulf, but the US, Russia, Turkey – and, lately, China – all have geopolitical cards to play.'

Amerada Hess is optimistic about the region. 'We think the legal frameworks of Azerbaijan and Kazakhstan are at standards that allow us to operate,' says Hardman. 'We are also reasonably certain that the terms of the contract are not going to be changed.'

Johnson thinks that the export issue will be resolved within the decade: 'There is tremendous pressure to find a solution. Considerable progress has already been made on a number of pipeline routes.'

In Russia, sanctity of contracts, export complications, and organised crime are some of the worst problems. 'The local 'oblast' authorities and the central Moscow authorities are not connected up, and they can stall each other out,' says Johnson.

Furthermore, when production entitlements are established, the oil that a company loads into a pipeline at the producing end may change quality and quantity by the time it reaches the export terminal. 'It can get mixed with other crudes. In some areas, it may get tapped along the way.'

Organised crime can have an adverse impact. A foreign company entering a joint venture has to take care to ensure against being defrauded, or finding itself the unwitting partner in a money laundering scheme.

Southeast Asia, including Burma and Indonesia, has tremendous potential for gas development, but the risks of civil unrest and international condemnation run high. 'We have about 70 people in our office in Jakarta,' says Jamieson. When Indonesia erupted in violence earlier this year, Premier, in conjunction with its security advisers, flew everyone safely out within 24 hours.

Burma, or Myanmar, is ruled by a repressive military regime that refuses to acknowledge the opposition victory of Aung San Suu Kyi in the 1990 parliamentary election. A consortium of NGOs and pressure groups has mounted an international boycott that has resulted in several manufacturing companies pulling out of the country.

Although Premier is under considerable pressure from human rights groups to divest its Burmese holdings, the company intends to remain. 'Unilateral sanctions and boycotts are not effective,' says Jamieson. 'It makes the plight of local people worse.'

The Middle East region – Saudi Arabia, Iraq, Iran, the United Arab Emirates – holds the majority of conventional oil reserves. It remains the largest prize, but it is also the most difficult to access. Saudi Arabia is out of bounds due to nationalisation, and Iraq and Iran are entangled in international embargoes and sanctions.

The political situation in Iraq is very unstable,' says Johnson. Although the consultant believes there are many non-US firms ready to invest in Iraq if the sanctions are lifted, it could be a long time before they see any payback from investments.

On the other hand, Iran and the US have recently engaged in dialogue, and Johnson believes that sanctions could possibly be lifted in the next year or two. 'If they are lifted,' the consultant warns, 'smaller companies might find themselves elbowed aside as the big US firms rush to enter.'

#### Words of warning

In conclusion, most veterans of international E&P recommend a combination of foreknowledge, self-respect and caution. 'Don't go on hearsay,' says Johnson. 'Make sure you know all the ins and outs of a country before you commit.'

'It is extremely important to maintain the reputation of your company,' says Jamieson. 'We at Premier want to be seen as an independent that is valued by shareholders, govermments and industry partners.'

'We as a company have taken the position that we will not work in a country where there is a unacceptable level of personal or corporate risk,' says Hardman. 'Our employees are like members of the family, and we don't want to be sending off members of our family to dangerous places.'

In the next article on Geopolitical Risk, Petroleum Review examines what happens when nongovernmental organisations target individual oil companies, and how they respond.

## Application of Control of Substances Hazardous to Health (COSHH) Requirements for Carcinogens at Oil Refineries and Terminals

his short guidance document is aimed principally at health and safety professionals, coordinators, and line management of companies in the downstream sector of the oil industry who own or undertake work at refineries and terminals. It is intended to provide a basis for common understanding between such persons and the statutory enforcement agencies on the application of the Control of Substances (COSHH) Hazardous to Health **Regulations Carcinogens Approved Code** of Practice for such installations.

The guidance covers the current occupational hygiene approach within

the oil industry to risk assessment; monitoring; control; designation/sign posting; contractors; and information, instruction and training for carcinogens. However, it does not include detailed procedures for carrying out COSHH assessments. The Health and Safety Executive has seen and commented on the guidance, which is intended to be a 'sister' document to the one published in 1996 by the United Kingdom Petroleum Industry Association (UKPIA), entitled Petrol at Retail Filling Stations – Application of COSHH Carcinogens Approved Code of Practice.

Lynne Morgan, Chairman, Occupational Hygiene Sub-Committee

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## Technology direct fuel injection

# Direct injection petrol engines to stop shift to diesel?

Until recently car buyers could only choose between petrol or diesel power, but there is now a third alternative which uses diesel-style fuel injection technology to inject fuel directly into the cylinders of petrol engines. *Gibb Grace* looks at the direct injection petrol engine technology and assesses its likely impact on the fuels retailing market.

otor spirit sales have been effectively static over the last decade or so, while diesel fuel sales have risen by over 40%. This situation has not come about by chance as the change in emphasis has involved many millions of individual decisions, which for the most part are based purely on cost. Diesel fuel costs about the same as unleaded petrol but the diesel engine's superior thermal efficiency guarantees superior fuel consumption.

It has to be said that the diesel vehicle has had most success in the commercial sector where operating costs are the name of the game. Heavy trucks have been wholly diesel powered since the 1960s, medium vans soon followed, and even light vans are now effectively 100% diesel powered. Sales of 4x4s are also predominately diesel if we add in the Land Rover, and the diesel is even beginning to bite into the car market.

The diesel share of the new UK car market climbed from 4.6% to 18.1% in the ten years from 1987 to 1996, and in that same period over 2.3mn diesel cars were sold, along with a million commercial vehicles.

### **Direct injection petrol engine**

Faced with this onslaught from the diesel, petrol engine engineers had to



Key to direct injection is the common rail fuel system, which allows the quantity of fuel, the moment of injection and the shape of the fuel jet to exactly match the engine's operating condition.

respond. They did so by adopting diesel style technology and introducing the first direct injection petrol engines. In September 1995, Mitsubishi introduced its GDI (gasoline direct injection) engine, and Toyota followed with its direct injection 4-stroke gasoline engine (D-4) at the end of 1996. Audi has also shown a prototype FDI (fuel direct injection) engine in its AL2 concept car.

Conventional petrol engines burn a mixture of air and fuel. Typically, the fuel is sprayed into the individual inlet ports at a relatively low pressure of 3 to 4 bar (45 to 60 psi), to coincide with the induction stroke. For the fuel to burn completely, and produce the minimum exhaust emissions, 1 kg of fuel needs to be mixed with 14.5 kg of air. This air/fuel ratio is represented by the Greek letter Lambda (0), and for the basic 14.5 to 1 ratio, the so-called 'stoichiometric ratio', ◊=1. Experimental work had shown that at 0=1.8, fuel consumption could be improved by some 10%, and suggested that running at ()=2.8, would give a saving approaching 20%.

However, getting such a 'lean burn' engine to run reliably above  $\Diamond = 1.8$ proved impossible with conventional fuel injection techniques, and further progress depended on a cheap, reliable means of accurately controlling the fuel supply. This was eventually solved by the 'common rail' injection system developed for small diesels, whereby fuel is stored at high pressure (120 bar) in a central manifold and supplied directly into the individual cylinders via solenoid valves in precisely the right amounts and at precisely the right time as determined by an ECU (electronic control unit).

Petrol engines are efficient at full load but much less so at part load and idle, and the challenge for the designers was to come up with a fuel system that could handle both extremes. The trick it turned out was to use two types of combustion – one to handle the part load situation and another to handle full load.

At part load the engine operates in lean burn mode and uses very little fuel. The fuel itself is injected late in the compression stroke, near to top dead centre and just before ignition. The time window is very short and calls for a short, sharp burst of fuel, and this is exactly what direct injection delivers. The selectable injection pressure ensures good atomisation, and the injection event and the spark can be timed to the millisecond.

## Technology direct fuel injection

The difficult part was to contain the fuel close to the spark plug, otherwise so small an amount of fuel would be diluted below the crucial stoichiometric level and fail to ignite. This was eventually achieved by using what is termed a stratified charge technique. Key to this is the way in which the air is introduced into the cylinder. In the Toyota D-4 engine for example, two inlet tracts are used, one being straight and the other being shaped, to impart a swirl to the incoming air. In lean burn mode the straight tract is blocked off by means of an electronically controlled butterfly valve, and so the incoming air swirls relatively gently, keeping the fuel contained close to the spark plug.

At high load conditions the engine must operate stoichiometrically and so needs an homogeneous charge. This demands a much broader fuel pattern and thorough mixing of the charge, and so fuel is injected on induction stroke. In the case of the Toyota D-4 engine, mixing is helped by using both the straight and swirl ports. Mitsubishi uses a vertical inlet tract to promote strong tumbling and mixing of the air and fuel throughout the cylinder. In the changeover from stratified lean burn to stoichiometric combustion and vice versa, there is a period of semi-stratified mixture which is achieved in the D-4 by having two injection events, one during the intake stroke and one towards the end of the compression stroke.

## Improved thermal efficiency

In conventional petrol engines the throttle is almost closed at low load so that the engine has to expend energy to draw in the air it needs. However, with direct injection engines, the throttle is wide open even at low speeds, significantly reducing these pumping losses. Also, because of the stratified charge technique used in the lean burn mode, much less of the heat of combustion is lost than normal. An air layer is formed next to the cylinder wall, reducing heat loss, boosting thermal efficiency and improving fuel combustion.

## **Exhaust emission control**

Three-way catalysts have become the norm on conventional petrol engines, but in order for them to work effectively, the engines have to run at  $\delta = 1$ . Direct injection engines run very lean for much of the time and under these conditions, a conventional three-way catalyst cannot control NO<sub>x</sub> (nitrous oxides) effectively because of the oxygen rich environment.

Toyota and Mitsubishi have each successfully solved this problem in different ways. Toyota's D-4 engine uses exhaust gas recirculation (EGR) and a novel NO<sub>x</sub> storage reduction type catalytic converter, while Mitsubishi uses a



The red arrows show the path of the incoming air in Mitsubishi's GDI engine developing the maximum turbulence in the cylinder as required for stoichiometric operation.

'selective reduction' device in which the  $NO_x$  is reacted with any available hydrocarbon during lean burn conditions, and with carbon monoxide during high load conditions.

This is all pretty advanced technology which delivers real advances in petrol engine performance. This new breed of direct injection petrol engine not only meets all foreseeable exhaust emissions legislation, but also gives that all important fuel economy improvement. Mitsubishi claims a 20% improvement overall, while Toyota is claiming 30%. Also, because direct injection engines are less prone to 'knock' under low speed/low load conditions, they can run with a higher than normal compression



Reverse tumble motion in Mitsubishi's GDI direct injection petrol engine

ratio, and thus develop up to 10% more torque in low to mid rpm range. And, because the fuel injection acts immediately, the engine responds more sharply, giving better overall acceleration.

There is no doubt that direct injection is a major advance for petrol engines, and they could well become the norm over the next decade. Mitsubishi for one, has said it expects to be building nothing but GDI engines by the year 2005. But whether they are good enough to stop the march of the diesel remains to be seen. For, despite the improvements made, direct injection has barely brought the petrol engine to where the indirect injection diesel was ten years ago in terms of fuel consumption.

And the diesel is not exactly standing still. Diesels are also going direct injection with a vengeance, and already delivering unheard of fuel consumption figures. Rover's 2.0 litre L series DI diesel for example is said to return 70.3 mpg at a steady 56 mph and Vauxhall's 2.0 litre DI ECOTEC diesel 74.3 mpg. Mitsubishi is planning to introduce a DDI (diesel direct injection) engine and Toyota is also backing the DI diesel by introducing a family of three such engines. The smallest of the three, a 1.5 litre unit destined for a small passenger car, is expected to return a steady 56 mph figure of over 90 mpg.

Given similar emissions performance and fuel pricing, the diesel will continue to win out simply because of its superior fuel consumption, and so we can expect motor spirit sales to continue to stagnate if not fall, while diesel sales continue to rise.

# **Tackling demanding offshore** environments

The international oil and gas industry has increasingly moved into deeper waters in recent years and Kvaerner has been at the forefront of developing solutions for operating in these harsh and demanding environments. As a result it recently unveiled two new 'ground breaking' concepts - a floating, production, drilling, storage and offloading vessel (FPDSO) and a deep draft floater (DDF). Stuart Lawton-Davis of Kvaerner explains how the systems operate and outlines their benefits compared with more conventional floater designs.

ogether with Single Buoy Moorings (SBM), Kvaerner looks to have solved one of the key problems which has so far held back the use of the novel idea of combining both drilling and production facilities in a single unit - a concept which could offer substantial cost efficiencies. The industry has been reluctant to accept the 'drilling through turret' technology, primarily due to concerns over weight increases on the turret and the turret bearing system. Kvaerner's FPDSO approach, however, is considered a breakthrough because it solves the problems associated with increased turret loading by supporting the drilling operational loads from the vessel deck. The arrangement also results in a reduced stack up height and wind profile of the drilling/turret area.

In close collaboration with SBM and with cooperation from Statoil, who provided input to the functional requirements and operational aspects of the FPDSO, the vessel has been designed as a monohull which supports a combination of drilling, production, storage and offloading functions (see Figure 1). Combined with a subsea completion system placed directly below the vessel, the FPDSO allows a full field development and operation from just one single unit.

The drilling arrangement is based on a novel solution developed for drilling through the centre of a geostationary

large diameter turret. This feature is combined with a highly efficient riser and drillpipe storage and handling system. Surface handling of BOP and subsea equipment takes place at the vessel's main deck elevation as the proposed turret solution offers direct access into the turret centre from the deck level. This allows a moderate substructure/derrick stacking height in the drilling area, and the arrangement resembles the one currently used on modern large semi-submersibles. The vessel's high topside deck payload and consumable supplies capacity, together with its favourable motions characteristics, makes it particularly well suited for deepwater operations in remote areas.

A key element in the design is the fluid transfer system which allows a ±270 degree rotation of the vessel at the same time as it offers access from the main deck into the centre moon-pool. The vessel is kept on station by a turret mooring which is designed to be 'passive' under normal sea states, but is assisted by a number of thrusters in order to maintain proper operative heading and position control in bad weather.

The FPDSO concept is seen as the most promising solution for areas where deepwaters and adverse weather conditions are encountered, such as the West of Shetlands or the Vøring Plateau in the northern North Sea. In addition, like most floating pro-



Figure 1: Floating, production, drilling, storage and offloading vessel (FPDSO)

duction concepts, the FPDSO has the advantage of being relatively insensitive to water depth variations and can

easily be adjusted to suit significantly

Technology

shallow water depths. Kvaerner believes that the new concept could compete efficiently on fields currently being developed by more conventional FPSO systems. There is also great potential worldwide for an FPDSO solution, especially for putting a drilling turret on an existing conventional FPSO or vessel. This conversion into FPDSO mode would suit more benign offshore areas such as West Africa and the Far East. The company also believes that the FPDSO will replace current FPSOs with separate drilling units within the next 10 years, in particular in fields with compact deep reservoirs which allow for deviated wells from closely spaced subsea templates.

It is planned to test a model at the Marintek facilities in Trondheim, Norway, in November 1998. With contract discussions possibly starting in spring/summer 1999, Kvaerner hopes that an FPDSO vessel could be ready for use in Norwegian waters as early as the summer of 2002.

### Deep draft floater

The second concept that has been developed for harsh and demanding environments is the deep draft floater (DDF) platform (see **Figure 2**). Specifically developed for water depths ranging from as little as 130 metres and up to as much as 2,000 metres (425 to 6500 ft), the DDF is a novel concept based upon proven technology that was developed by Kvaerner initially for semi-submersibles.

It employs a compact riser concept, that can be pre-assembled onshore and towed to site for installation, and dry Xmas trees. The DDF can support the full spectrum of topsides design, from minimal, not normally manned facilities to facilities weighing up to 25,000 tonnes. Full drilling option can be incorporated into the topsides design to give the operator flexibility in field development. Riser tension is achieved with either a combination of buoyancy and tensioners or, if the riser is of low enough submerged weight, solely by tensioners. The multi-leg steel hull provides full access throughout the flotation columns permitting easy maintenance and inspection. The simplified construction of ring-stiffened shells can be fabricated worldwide.

The mooring system ranges from catenary, to semi-taut, to taut depending on the environment and the watch circle required to access the subsea wellheads. The platform can resist the most severe ocean storms and is ideally suited to a wide range of development scenarios including the North Sea, the Atlantic Frontier, the Caspian, the Gulf of Mexico, offshore Brazil, West Africa and the North West Shelf of Australia.

floaters

The primary benefit of this new concept is the low structural weight, especially when substructure weight is compared with topsides weight. This enables fast and cost effective development execution from a simple steel plate construction. The concept is developed to use proven technologies, such as external TLP risers and existing well, process and subsea systems. Kvaerner has already carried out detailed model testing of the DDF at a test basin in Escondido, California, which has produced very successful results.

In addition to the weight advantages, the substructure is capable of being transported on a semi-submersible ship or wet-towed as single piece to any location in the world. Furthermore, the deck facility can be installed using a float-over technique thus saving heavy lift costs and minimising offshore hook-up time.

Kvaerner believes that there is a requirement in the industry for a concept such as the DDF. While TLP and SPAR concepts already exist and meet the necessary criteria for a deepwater FPS with dry well heads, they still have a number of perceived shortfalls. The TLP has water depth and topsides weight limitations together with a complicated tether system. The SPAR has riser/substructure diameter impact which, together with a complicated fabrication process, leads to a limited source of fabrication yards, solely in Finland.



Deep draft floater (DDF)

## **The Jane Carter Prize**

The British Institute of Energy Economics, the International Association for Energy Economics and the Association for the Conservation of Energy invite the submission of essays for the 1998/99 award of the Jane Carter Essay Prize. This year's prize will be a cash award of US\$800 together with a plaque.

Essays can be on any aspect of energy efficiency and conservation or on aspects of general energy and environmental policy which are relevant to energy efficiency. The aim is to encourage new thinking on these subjects. The emphasis of the essay should therefore be on the policy – rather than the scientific or technical – aspects of the subject.

The competition is open to anyone under the age of 35. Essays should not be more than 8,000 words long, and can be based on work done for another purpose (eg an academic thesis or policy report), however the results of that work should be presented in an original form. The winning essay will be considered for publication in a range of energy and environmental journals.

Essays should be submitted in English, in triplicate and typed form, by 30 June 1999, and sent to:

Mary Scanlan, Administration Secretary British Institute of Energy Economics 37 Woodville Gardens London W5 2LL

Each essay should include a 150-word summary. The name, address and age of the author should be on a separate sheet that can be detached from the essay, which will be judged anonymously. Manuscripts will not be returned.

## **Space-age onshore exploration**

As a major provider of satellite imagery and geological image interpretation products, the National Remote Sensing Centre (NRSC) has experienced a dramatic increase in the quantity of satellite data provided to oil and gas exploration companies over the past three years. This increase partly reflects the acceptance of satellite imagery as a standard exploration tool as oil and gas companies focus their exploration efforts in remote areas with difficult terrain, complex and poorly understood structure and/or political sensitivity, writes Dr Martin Insley, Geological Interpretation Manager for NRSC.

Statellite imagery provides a rapid and cost effective method of evaluating the potential of a region anywhere in the world for favourable hydrocarbonbearing structures and possible leads where fieldwork may be necessary. The data has a 'free-skies' classification allowing free-access to any part of the world no matter how sensitive.

But how can imagery taken 700 km to 900 km above the earth's surface help exploration? The basic product is an up-to-date digital or hardcopy image map which accurately portrays features on the ground without the intervention of an artist's pen. The image can then be used for validating existing mapping.

Company geologists are not only taking satellite images into the field combined with GPS (global positioning system) for accurately locating their positions but also digitally on laptop computers to enable real-time image processing and image interpretation. A whole range of classification and interpretation maps can then be derived from the imagery including geological maps, terrain accessibility maps (for logistical planning of seismic surveys and well locations), environmental baseline classification maps and change detection maps to evaluate environmental impact.

The imagery can also be used as a scouting tool to assess concession areas not just for structure, but also the location of existing seismic lines, recently drilled wells and infrastructure including pipelines and storage facilities.

The main factors for determining the suitability of a particular type of satellite imagery for exploration are the spectral, spatial and temporal resolution of the sensor, whether stereo imagery is required, and whether optical or radar data is necessary.

### Multispectral satellite imagery

Multispectral data provides the ability to generate coloured imagery. To date, Landsat TM (Thematic Mapper) has the best spectral resolution for geology both in terms of the number of different spectral bands and width of spectral bands (Table 1). By contrast, SPOT (Systéme Pour l'Observation de la Terre) multispectral (XS) and the Indian Remote Sensing satellites IRS-1C and 1D LISS have multispectral data sets but their spectral band combinations are best for vegetation mapping rather than lithological classification. Figure 1 shows the Hundi Gas field in Pakistan and highlights the advantages of using Landsat TM for lithological discrimination by combining three bands (7,4,2) from the mid-infrared, nearinfrared and visible green part of the electromagnetic spectrum. Various numerical operations can also be applied to combinations of spectral bands to highlight clay and iron oxide rich lithologies and gach-i-turush (surface alteration features) associated with localised sulfurous hydrocarbon seeps.

### **High spatial resolution**

Spatial resolution is a critical factor which not only dictates the optimum working scale at which a satellite image can be used (see **Table 2**), but more importantly the ground resolution cell or minimum distance at which two objects can be distinguished. However, features such as faults are often below the resolution of the system and yet visible on satellite images when units of contrasting spectral signatures are juxtaposed.

Similarly, seismic lines and well pads are often visible on Landsat TM imagery due to significant contrasts in their spectral signatures compared to the surrounding area caused by site clearance in preparation for seismic acquisition or rig placement.

In practise Landsat TM and MSS (multispectral scanner) data are generally used for defining regional tectonics and structural setting of basins; panchromatic SPOT and IRS-1C/1D data for detailed structural analysis of individual concession areas and structural prospects; and high resolution Russian imagery for detailed fracture mapping (Table 2).

Russian imagery includes DD2, KVR-1000, KFA-3000, KFA-1000, MK-4, and KATE-200 which have spatial resolutions of 1-2 metres, 2 metres, 2-3 metres, 5 metres, 7.5 metres and 20 metres, respectively. Although the data has the advantage of higher spatial resolution, global coverage and repeat scenes are limited and supply of digital data is via the scanning of photographic negatives. Image quality is therefore often variable. It is common practise to merge the spectral information of one data set, for example Landsat TM, with higher spatial resolution data such as SPOT or IRS-1C/1D data for detailed lithological and structural mapping.

## **Temporal resolution**

Temporal resolution is related to the length of time required for a satellite

Exploration

## remote sensing

Optical sensors: Multispectral data	No of spectral bands	Swath width (km)	Spatial resolution (metres)	Stereo capability	Optimum working scale	Type of analysis
RESURS-01	5	600	160	no	1:400,000	Petroleum
Landsat MSS	4	185	80	no	1:200,000	Petroleum basin
Landsat TM	7	185	30 bands 1–5, 7 120 band 6	no	1:100,000 1:250,000	Petroleum basin
IRS-1C and 1D	4	141	23.5 bands 2, 3, 4 70 band 5	no	1:50,000	Petroleum basin
SPOT XS	3	60-80	20	yes	1:50,000	Structural
LSPOT 4	4					prospect
MK-4	3	102.5	7.5	possible	1:25,000	Structural prospect

#### Table 1: Characteristics of multispectral optical sensors

to provide repeat coverage of a given area. This aspect is an important consideration for monitoring environmental impact related, for example, to seismic acquisition or drilling operations, and assessing areas of stressed vegetation related to hydrocarbon seeps.

The normal revisit times are 16 days for Landsat 4 and 5, 26 days for SPOT, 24 days for IRS-1C/1D, 35 days for ERS, and 24 days for RADARSAT. In the case of SPOT repeat time can be as short as three days and two to five days for RADARSAT depending on the viewing angle of the satellite.

### Stereo-satellite imagery

SPOT was the first satellite to provide stereo-image pairs. This allowed standard airphoto stereoscopic interpretation techniques to be employed for 3D visualisation of terrain and geological structure. This capability is also provided by RADARSAT for areas where optical sensors are not practical. Stereo-SPOT data also enabled the step from qualitative to semi-quantitative structural analysis through the generation of digital elevation models (DEMs).

From just one stereo-pair of SPOT images, height values with planimetric accuracies of ±25 metres and vertical accuracy of ±7 metres can be computed for every 20-metre grid cell over an area of approximately 2,500 sq km. Using this information, NRSC developed software to determine dip and strike of bedding surfaces from 3-point measurements of X,Y,Z coordinates made on-screen through combining images with DEMs.

In areas such as Yemen, measuring dip and strike from 'space' was more accurate than field measurements. Yemen also provided a test area for converting height information for individual bedding surfaces into structure contours to analyse displacement patterns around faults, regional dip slopes and the extent of surface closures. In addition, it is now routine to drape satellite imagery over DEMs to produce perspective views or simulated flythroughs to give a visual impression of exploration acreage.

#### **Onshore applications**

The last major factor which dictates the type of satellite data which should be used concerns the type of terrain and environment where the surface geology is obscured from optical sensors by persistent cloud, dense vegetation, and thin sand cover, or where the structures have only subtle surface expression.

This problem has been solved by the availability of ERS-1/2, RADARSAT and JERS-1 synthetic aperture radar (SAR) imagery which can penetrate rain, cloud and haze as well as acquire images both day and night. Out of these three satellites only RADARSAT provides the flexibility to acquire imagery at different scene sizes (at the expense of ground resolution), and variable incidence angles for stereo coverage (**Table 3**). This allows the same data source to be used for both regional structural evaluation and detailed structural analysis.

One of the main problems of using radar data is the inherent distortions in the imagery related to variations in topography, a phenomenon known as foreshortening or lay-over in areas of severe terrain variations. This problem has been overcome by using terrain correction packages, such as NRSC's TSAR, to automate the production of orthocorrected SAR images from a DEM, often itself derived from stereo-RADARSAT images.

Radar images record changes in the level of backscatter of the radar signal caused by variations in the surface roughness (hence its application in offshore seep detection), relief and moisture levels. The wavelength used by



Figure 1: A comparison between SPOT XS (left) and Landsat TM (right) imagery over the Hundi gas field where the grey coloured (in the field) Laki Limestone Formation (indicated by mauve coloured enclosures on TM) is overlain by yellow-brown ferruginous dolomite of the Kirthar Formation (red-brown coloured unit on TM). *Courtesy of SPOT Image* © *CNES* 1998

RADARSAT and ERS is not capable of penetrating the dense vegetation cover of tropical rain-forests. In these areas geological structures depicted on radar imagery therefore reflect the 'tree-top geology' whereby variations in the level of the canopy mimic the structure of the underlying terrain.

Radar imagery has also been used to map palaeo-drainage channels and structures buried below dry granular overburdens in arid and hyper- arid environments. The L-band Shuttle Imaging Radar (SIR-A, SIR-B and SIR-C/X) can give up to 6 metres ground penetration in these types of environments compared to less than 1 metre in the case of ERS and RADARSAT.

ERS and RADARSAT data are also used for interferometry which uses the phase difference between repeat images to measure centimetre scale relative changes in height. The technique has recently been used to measure the development of subsidence bowls over shallow oil fields in California caused by the extraction of large volumes of fluid combined with the compaction of reservoir rocks. The analysis indicated subsidence rates of 4 centimetres in 35 days giving a rate of 40 cm/yr.

### The future

The two main developments regarding satellite data in the short-term future are improved spatial and spectral resolution. Many of the new satellites planned for launch in the next 10 years will provide images with 1-metre ground resolution combined with a stereo-capability allowing the generation of between 2 metres and 5 metres resolution DEMs.

The introduction of more spectral bands with narrow band widths to improve the level of spectral classification and discrimination of rock types and potentially minerals is also a possibility.

Development of a proposed spaceborne hyperspectral sensor ARIES is currently being investigated by an Australian lead consortium. This type of spectral mapping is already available using a handful of airborne systems such as Texaco's own hyperspectral sensor TEEMS (Texaco Energy and Environmental Multispectral Imaging Spectrometer). The TEEMS scanner collects data throughout the ultraviolet, visible, and infrared portions of the electromagnetic spectrum. Its main uses are: establishing environmental baselines of physical and biological conditions; real-time, day or night, all-weather oil spill monitoring; and monitoring of exploration and production facilities. Exploration activities include detailed structural and outcrop lithology and mineralogy mapping and detection of onshore natural oil seeps.

#### Strength of satellite data

The strength of satellite data and derived products is that they can all be supplied in digital formats and accurately registered and truly integrated with other data sets including potential field data and seismic.

This combination not only provides the link between the surface and subsurface geology and the relative timing of structures, but helps to provide a true 3D analysis. Satellite imagery should be considered more than just a pretty picture and rather a valuable source of data for the evaluation of an area prior to setting foot on the ground.

Optical sensors: Panchromatic data	Swath width (km)	Spatial resolution (metres)	Stereo capability	Optimum working scale	Type of analysis
SPOT Pan	60-80	10	yes	1:25,000	Structural
IRS-1C and 1D Pan	70	5.8	possible	1:15.000	prospect Stuctural
NAME A			Accession of		prospect
MK-4	11/-1/3	7.5	no	1:25,000	prospect
KFA-1000	141	5	no	1:15,000	Structural
KFA-3000	60-85	2-3	no	1:10 000	prospect DFM*
KVR-1000	102.5	2	no	1:5,000	DFM*
DD-2	30 (minimum)	1–2	no	1:5,000	DFM*

\* DFM – Detailed fracture mapping

#### Table 2: Characteristics of panchromatic optical sensors with high spatial resolution

SAR sensors:	Swath width (km)	Spatial resolution (metres)	Band frequency	Stereo capability	Optimum working scale	Type of analysis
RADARSAT			C-band 5.3 GHz			
ScanSAR Wide	500	100	194 M.S. 24	no	1:250,000	Petroleum basin
ScanSAR Narrow	300	50		yes	1:125,000	Petroleum basin
Wide Beam Mode	150	30		yes	1:100,000	Petroluem basin
Standard Beam Mod	e 100	30		yes	1:75,000	PB/SP*
Fine Beam Mode	50	10		yes	1:50,000	Structural
ERS-1/2	100	30	C-band 5.3 GHz	no	1:100,000	PB/SP*
JERS-1	75	18	L-Band 1.3 GHz	no	1:50,000	Structural prospect

PS/SP\* – Petroleum basin/structural prospect

Table 3: Characteristics of SAR (synthetic aperture radar) sensors

## Routes and finance the key to Azeri developments

The Central Asian Republic of Azerbaijan, which only gained independence in 1991 has already notched up \$30bn in investment and 15 production sharing agreements (PSAs) with three inked by British companies in July 1998. It has 11bn barrels of proven reserves and according to conservative estimates by the World Bank will produce 11mn barrels in 1998, rising to 490mn barrels in 2010. But the country is landlocked and the issue of oil and gas export pipelines remains the greatest uncertainty, reports Priscilla Ross.

Caspian pipelines

In the development of a new province or region, the location of the initial major finds usually determine pipeline routes and locations. In Azerbaijan a whole series of logistical, political and historical influences mean that two routes are being developed (via Russia and to the Black Sea at Supsa) while a third to Ceyhan in Turkey is being actively promoted.

A conference on 'Doing Business in Azerbaijan' was held in London in July 1998, and timed to coincide with the official visit of Azeri President Heydar Aliyev to the UK. At the conference, President Aliyev was asked about who will pay for the cost over-runs on the Baku-Supsa oil pipeline, where costs will have ratcheted up from \$350mn to \$590mn when the project is completed in early 1999. His reply was the consortium financing the project - the AIOC (Azerbaijan International Operating Company), a consortium of 12 companies including BP, Lukoil of Russia and Socar, the Azeri state oil company. 'It is their problem. I don't see any problem here', he said.

### **Rates of return**

The realities of exporting oil from Azerbaijan were addressed in a presentation by Bruce Payne, Director, CIS Project Finance, Chase Manhattan. 'In most developed countries, pipelines normally have an internal rate of return in the 10–12% range. In contrast the minimum rate of return for an exploration and production operation is typically in excess of 18%,' he explained.

He added that pipeline companies in developed markets traditionally rely heavily on debt finance: 'as much as 80% of their capital structure may be in the form of debt due to their low risk, utility-type returns'.

Payne believes that: 'Foreign oil companies need not tie up billions of dollars of their own money in these relatively low margin infrastructure ventures. The opportunity for financing major projects in the Former Soviet Union (FSU) by international financial institutions, banks and the capital markets is rapidly developing.'

This banker's perspective was particularly poignant as, according to Azeri sources, BP and Norwegian state oil company Statoil had offered to construct a politically sensitive oil pipeline from Baku, the capital of Azerbaijan, to Ceyhan in Turkey in return for exclusive control of the line. However President Aliyev rejected the offer in favour of a proposed plan for a major export pipeline to include the 12 members of AIOC which is already committed to Azerbaijan in the first mega foreign oil project in the Azeri sector of the Caspian Sea.

BP, however, confirmed that its plan to lead the financing and construction of the Turkish pipeline was under the AIOC umbrella and not for the exclusive right of BP and Statoil.

## **Multi-source financing**

Returning to pipeline economics Payne said the IFI lenders – international financial institutions (including the multilateral lending agencies: IFC, EBRD and/or the export credit agencies such as US Eximbank or Japanese Eximbank) – have been 'by far the central source of funding for projects to date in the FSU'.

He added that, importantly, project financing of an FSU pipeline investment will most likely require a multisource approach combining loan facilities from two or more of the lenders currently financing FSU projects. These include IFI lenders, 10 to 15 US and European commercial banks and, potentially, bondholders.

A rule of thumb estimate for pipeline capital expenditure cost is \$1mn per mile for a large-diameter pipeline across relatively flat, non-environmentally sensitive terrain. This does not include the cost of an offshore loading terminal. A pipeline's pay-back period is rarely less than 10 years.

Revenue is based on a tariff charged on a fee per barrel of oil transported over a set distance. Tariffs have a natural ceiling level. Too high a tariff will damage the economics of the oil fields feeding the pipeline. Depending on the field, a tariff over \$3.50/b when the oil price is \$16/b to \$18/b may be approaching the economic limit. Much higher and the oil producers will be losing money over every barrel shipped.

An oil pipeline's volume throughput is the venture's key economic variable. Lenders to a long-distance pipeline venture normally need the pipeline company to have secured either a longterm throughput and deficiency agreements with financially strong shippers or financial guarantees from credit worthy parties such that the cash flow stream can be projected with a high confidence level.

The extent to which the owners of the pipeline will also be the primary shippers has major implications. Maintaining management and operating controls in the hands of western oil companies is crucial. More than 50% host government ownership could make a private financing difficult. The composition and nationality of the private pipeline sponsors will influence the attractiveness of the project to the market. Certain bilateral lending agencies (OPIC and Japanese Eximbank, for example) require a minimum level ownership from their national companies.

### Early strategic approach

According to Chase the successful project financing of a Caspian oil pipeline will require a strategic approach during the project's early commercial blueprint stage. Competent financial and legal advisers with proven transaction experience in the FSU will add value early in the commercial negotiation process before irreversible structuring decisions have been made. The fundamental financial policy decisions between the project sponsors need to be resolved at the outset of the venture's structuring.

He added: 'While project finance is not the traditional avenue taken by all major oil companies in funding their E&P projects around the world, the massive investment needed in pipelines originating from the Caspian region will no doubt need a non-traditional approach."

Any financial adviser worth its fees should be willing, if requested by the sponsors, to provide financings for the project as a loan arranger. The demonstration of support for the initial projects in the emerging markets of the Caspian region to the rest of the lending community may serve as a critical catalyst for unlocking the billions of dollars that will be needed to launch these major projects.

Year	Oil (k b/d)	Gas bcm	
1987	285	11.7	
1988	280	11.1	
1989	270	10.4	
1990	255	9.2	
1991	240	8.0	
1992	225	7.4	
1993	210	6.3	
1994	195	6.0	
1995	185	6.2	
1996	185	5.9	
1997	180	5.6	
Source: BP Statistical I	Review		

#### Azerbaijan oil and gas production 1987-97



## The Future of Transportation Fuel Quality in Europe

## London: 12–13 November 1998 organised by the IP in association with



This major international Conference will bring together representatives from the European Commission, UK Government, the oil and automotive industries, environmentalists and academia to present their views on current and future legislation, the inter-relation between automotive vehicles and fuels and their impact on the environment, and the implications for the European refining industry. The concluding session will provide an opportunity to hear the opinions of industry representatives on how they see the way forward into the next millennium.

Who should attend?

- Refiners/Contractors
- Vehicle Manufacturers
- Policy Makers/Planners and Strategists
- R&D Managers
- Health, Safety and Environmental Personnel
- European and National Government and Civil Servants
- Non Governmental Organisations
- Transport Managers/Fleet Operators
  - Oil and Motor Manufacturing Industry Consultants and Analysts

# Fears that low oil prices could hit future North Sea investment

ONS '98 was held in Stavanger on 25–27 August. Jeremy Cresswell reflects back on some of the more notable papers and events at what turned out to be a most successful convention despite the slump in oil price.

f oil industry bosses believe that they are going to get any sympathy from the world's top bankers just now, they can think again if last month's Offshore Northern Seas convention was anything to go by. In fact, the President of the powerful Deutsche Bundesbank is thoroughly happy with the oil price downturn, as evidenced by his ONS '98 address.

'As a German banker, I cannot help being satisfied on the whole with the current price situation in most parts of the world... that is also true of petroleum,' Dr Hans Tietmeyer told delegates. 'I hope my Norwegian hosts will not throw me into the cold North Sea for that remark, but there are always two sides to price movements.

'The current low oil price has contributed to the slowdown in worldwide price rises at the various levels.' Tietmeyer explained that this had helped curb consumer price increases in Germany and afforded relief on the import side of its current account, which in turn has helped the external value of the Deutschemark.

'As you see, it is the same old story in economics. How you assess a price depends primarily on whether you are a supplier or a demander,' he commented.

Tietmeyer did not confine himself to outlining the benefits low oil prices can bring, or the growing economic slump worldwide. He also had a message for petroleum industry moguls about energy use and its impact on the environment. He stated that a better balance had to be struck between traditional sources like coal, gas and oil, and renewables, and that greater energy efficiency had to be achieved. Tietmeyer also warned against investing in, for example, solar technology as a window dressing exercise by oil corporates. 'Needless to say, that is partly for the sake of public relations,' he said.

Regarding curbing profligate consumption, Tietmeyer commented: 'Without any doubt, energy saving is the simplest and cheapest way of protecting the climate and conserving resources.'

## Flip side of the coin

While Tietmeyer expressed satisfaction about oil prices, Norwegian Energy Minister Marit Arnstad took the opposite view. She said that the current situation was unacceptable and that producers should make more effort to curb oil production.

'Today's low oil prices concern us and we recognise the stock situation and the effect on prices. The situation is serious as global stocks are at levels which are among the highest during the last decade.'

What appeared to particularly worry Arnstad was the fact that persistently low oil prices might blunt future investment levels on the Norwegian Continental Shelf. And yet she was also worried about the short-term risk of overheating the Norwegian economy through overly high investment levels. This was why a number of projects had been put on hold earlier this year.

Arnstad also expressed concern about the number of Norwegian sector developments suffering from significant cost overruns, so much so that a commission is being established to examine the issue. It is due to report its findings early 1999.

It remains to be seen what the real causes of the problem are, but Kvaerner Oil & Gas President Tore Bergessen said at a side briefing that the NORSOK cost cutting initiative had fundamentally failed, even though it was broadly modelled on the UK's Crine/Crine Network campaigns which he said had been successful.

Arguably the high point for Arnstad was the signing with UK Energy Minister John Battle of two agreements – a new Frigg Treaty and a further framework accord (see p3).

## Changing face of competition

An important theme of this year's conference was the changing face of competition in European gas markets. It is a challenge fraught with problems and the UK is in the lead in terms of opening its own marketplace to competition.

Christian Heinrich, Managing Director of Thyssengas, warned of tough times ahead on the Continent and said that there was no clear role model for others to follow. 'It must not be forgotten that the [market] structures in the various countries are very different,' he pointed out. 'For example, the French and British markets differ from the German market, as does the American market.'

'The gas companies will have to make sure they do not blindly copy what they have seen in other countries. Otherwise, more and more regulation by the legislators will be necessary,' Heinrich continued. He also talked of the emergence of a limited European spot market for gas, but that it would not displace existing markets, rather it would be supplementary.

## Show highlights

Most, if not all, major oil shows are used as a stage for big initiatives and deal announcements. The Frigg signing has already been mentioned, but that was not the only highlight at ONS this year. Transaction of the show had to be the acquisition by Aker Maritime of UK consultancy Genesis Engineering for an undisclosed sum, but believed to be more than £30mn.

However, the high point of the show came on the last day when the Norwegian Petroleum Directorate disclosed that the deepwater Ormen Lange structure held recoverable gas reserves provisionally calculated at 200bn to 400bn cm (twice the original size of Frigg and one-third of Troll) with the likelihood of a very considerable upside – a suitably positive note to close ONS '98.

# **Development for Sable Island six**

Sable Island is a windswept and desolate place which was famous, until recently, for only one thing – its wild horses. The lack of gas transport infrastructure meant that significant deposits of natural gas discovered in the sandstone rock underlying the island from the mid-1960s to the late 1980s commanded little interest. But recent advances in production technology, together with a forecast of growing gas demand for the region, has provided the impetus for a massive \$2-\$3bn development project, writes Jeff Crook.

**G**AIS

Six major gas fields containing 85bn cm of recoverable gas have been identified as suitable for development – these are Venture, South Venture, Thebaud, North Triumph, Glenelg and Alma. The fields lie 160 to 300 km east of mainland Nova Scotia close to the edge of the Scotia Shelf. Thebaud and Venture are located 10 km west and 13 km east of Sable Island respectively, while North Triumph lies 35 km south of the island. The water depth in the fields varies between 20 and 80 metres.

The Sable Island Offshore Energy Project (SOEP) consists of a central, manned platform complex in the Thebaud Field connected to unmanned platforms on the Venture and North Triumph fields. The Thebaud complex consists of a process platform bridgelinked to an accommodation platform. An export pipeline will be installed to a new gas terminal in Goldboro, Nova Scotia. Gas liquids will be transported by pipeline from the gas terminal to a new facility at Point Tupper for further processing and shipping.

Delivery of gas to markets in Nova Scotia, New Brunswick and New England is scheduled to start in late 1999. The expected daily average delivery will be 460mn cf/d of gas. The fields are also expected to yield 20,000 b/d of natural gas liquids.

Regulatory hurdles were overcome at the end of 1997 allowing the alliance partners to fully commit to the pre-sanction contracts that had been placed earlier. Offshore installation work started this spring when the giant heavy lift vessel Saipem S7000 installed the drilling jackets for Venture and Thebaud.

The Rowan Gorilla II jackup was outfitted in Dartmouth this year and is now drilling five wells in the cantilever mode through the Venture Field jacket. The Santa Fe Galaxy 2 jackup is approaching completion in Singapore and will start a drilling programme for five development wells through the Thebaud jacket in September/October 1998, before moving on to drill two wells at North Triumph.

Site preparations have begun at Sheet Harbour, east of Halifax, with the offshore pipe coating facility having already started to arrive at the site. SOEP awarded the pipelay alliance contract to Allseas Canada last April. This work is valued at around \$250mn to \$270mn. Allseas has committed the pipelay vessel Solitaire and trenching vessel Trenchsetter to the project.

A second phase of the development will commence early next century to develop the South Venture, Glenelg and Alma fields.



# NEWTechnology

## Pit POD safeguards aircraft refuelling operations

As part of the current IP, API and JIG investigations into safer aircraft refuelling practices, particularly in the vicinity of the hydrant pit, Warner Lewis has developed a new Pit POD (proximity override device), Model WL5400. This shuts off the hydrant pit valve in the event that a refuelling vehicle (or any other vehicle) comes too close to, or impacts, the hydrant pit while a coupler is connected and refuelling operations are in progress.

There have been a number of ramp accidents around the world in recent years, where vehicles have run into the pit coupler during fuelling, causing mechanical damage which, in turn, results in fuel spillage before the operator deadman system can react and close the valve.

The new Pit POD has been designed not only to eliminate (or, at least, reduce) fuel spillage in cases of coupler impact, but also in the event of the input coupler elbow separating from the API coupler for whatever reason, eg improper maintenance.

For the system to operate, it is necessary that the pit valve is fitted with an air operated or dual air/lanyard pilot.

When the hydrant input coupler is connected to the pit valve, the Pit POD must be fitted and the air line connected to the pit valve pilot in order to operate the



valve. The deadman air-line from the vehicle is connected to the pit valve via the Pit POD, causing both valves to open. If contact is made with the Pit POD, the pod frame tips against spring loading, activating pneumatic switches which allow air to evacuate the air feed line to the pit valve, causing it to instantaneously shut off. If the input coupler is then damaged, the pit valve will have already closed, thereby eliminating fuel spillage.

An optional siren which sounds when

the Pit POD is triggered and the pit valve closes is also available. A flag and light are also available for attaching to the unit.

According to Warner Lewis, its new unit is unlike any other pit safety device in that it actually signals the pit valve to close before the coupler itself is struck, providing the best chance for no fuel spillage.

Tel: +44 (0)1256 768811 Fax: +44 (0)1256 768818

## Process gas chromatograph first unveiled

Rosemount Analytical has developed what it claims is the first process gas chromatograph that can be handled like other Fisher-Rosemount field transmit-



ters. Conventional gas chromatographs are normally too bulky and slow for real time control of industrial processes and require a chromatography specialist for set-up and maintenance, states the company.

The GCX unit is said to eliminate this problem and to simplify all operator interfaces. The design is fully modular with components housed inside a lightweight, field-mountable, explosionproof enclosure.

The device is claimed to offer reduced capital costs, lower installation costs. shorter repair times, reduced operating costs and increased reliability compared with conventional gas chromatographs.

Weighing less than 50 kg, the unit is designed for a variety of process, pipeline and environmental applications where selected components in gaseous or liquid streams must be repetitively monitored. It is able to separate, identify and quantify multiple analysis components.

Tel: +44 (0)1243 863121 Fax: +4 (0)1243 845280

## Scully overfill system targets new markets

A high level alarm and overfill prevention system developed by Scully for aviation refueller and fuel farm fuelling operations is now available in the UK and Ireland.

The fail-safe system incorporates Dynacheck automatic and continuous self-testing circuitry and has been the standard for major oil companies for a number of years, states the company. Scully systems are used by the US Airforce and major airports including Los Angeles, Chicago O'Hare and Miami International.

The system consists of a self-checking electronic fuel sensing probe mounted at the top of each vehicle or tank and a control monitor. The fuel flow is automatically shut off in the event of system failure or an overfill condition.

Additional safety features include self-proving bonding and grounding, and a vehicle internal valve shut-off for defuelling operations.

Tel: +44 (0)1606 553805 Fax: +44 (0)1606 553824

# NEWTechnology

## **Multi-test verification materials**



Participation in formal quality schemes such as ISO 9000, NAMAS, national accreditation programmes, and the application of good laboratory practice, requires careful attention to detail. The incorrect determination of a parameter of a material can have far reaching financial or safety implications, and the use of automated instrumentation increases the possibility that an incorrect result will not be detected.

Cross-check programmes are a valuable way to continuously monitor instrument performance. However, the cost for a small laboratory in terms of time, money and long-term commitment may be too high.

In response to this problem, Stanhope-Seta has introduced a new range of certified reference materials. The Seta Multi-Test Verification Material is available for seven product specifications comprising kerosine, aviation gasoline, motor gasoline, bitumen, fuel oil, gas oil and lube oil.

Samples are an ideal reference material for equipment verification, evaluation and staff training to ensure correct and consistent analytical measurements, states the company.

Each 500 ml sample is supplied with certified data for multiple types of internationally accepted test methods enabling different tests and instrumentation to be validated from a single sample. Prepared under strict quality control conditions (ISO 9001 and ISO Guide 25) samples are blended by a major multinational refining company and tested internationally by a statistically significant number of laboratories to determine certified values.

Tel: +44 (0)1932 564391 Fax: +44 (0)1932 568363

## New computer package looks after the books

PDI has developed a new management information and financial accounting computer software package – Bookeeper – for service station forecourts and convenience stores.

The totally integrated system provides scanning at the till as well as the management of wet and dry stock inventory and provides completely automated accounting. The package is claimed to be simple to use and provides the user with checklists to ensure that nothing is overlooked.

Access to e-mail is also included, enabling the operator to directly contact on-line qualified accountants and technical support staff. Bookeeper Plus is also offered; it electronically transmits store data to PDI which acts as the operator's accountant, providing full financial statements and management reports.

The Bookeeper packages will run on a site's existing computer, as long as it meets PDI specifications, states the manufacturer.

Information is said to be easy to call up and simple to interpret. Any areas that a user needs to be aware of are highlighted.

Tel: +44 (0)1293 513535 Fax: +44 (0)1293 513166 e-mail: info@pdiltd.co.uk

## Liquid sensing deal

Wayde Industries of West Orange, New Jersey, has appointed Hockman-Lewis as international marketer for its liquid sensing and leak detection equipment to the petroleum industry.

Equipment includes the Wayde ETS 3000 Electronic Tank Stick which is based on an ultrasonic in-tank probe for horizontal and vertical storage tanks. The probe communicates liquid level to a controller with five tank capacity. Level readout is claimed to be  $\pm 0.1\%$  accurate, which is said to be sufficient to support SIR (statistical inventory reconciliation) leak detection.

The Wayde RE 430 D Sensor System provides dispenser shut-down for a variety of alarm conditions, with both discriminating and non-discriminating sensors for sumps and interstitial reservoirs.

Hockman-Lewis Tel: +1 973 325 3838 Fax: +1 973 325 7974

## New hydrant pit valve



Aircraft refuelling equipment manufacturer Avery Hardoll Fluid Management has unveiled a new range of hydrant pit valve – the PV2000. The new valve, which has a 4x4-inch configuration and is 12 inches high, was recently tested to the IP and API 1584 recommendations. The unit is said to offer smooth operating characteristics, low pressure drop and low overshoot on closure.

Available in standard format or with either a 4-inch to 6-inch spool piece, or under hydrant shut-off valve, the valve will fit all hydrant boxes that are IP and API approved, states the manufacturer.

Tel: +44 (0)1329 853374 Fax: +44 (0)1329 853065

# **NEW**Schnology

## New standard in oil in water on-line monitoring

Steptech Instrument Services reports that its new oil in water continuous online monitor has passed stringent field tests on Saga Petroleum's Snorre rig in the North Sea. 'The way is now clear for on-line monitoring to replace the existing infra red method, with savings in time, cost and environmental pollution,' states the company. The instrument is also said to be capable of detecting other entrained aromatic hydrocarbons.

The new system not only offers a better resolution than the currently used off-line laboratory tests, but also a far better resolution than existing standards demand, states Steptech.

Previously, compliance with OSPAR regulations for acceptable levels of oil in produced outfall water from oil rigs and other installations has been achieved by manual extractive infra-red testing of samples in the laboratory.

Environmentally, the process has proved unsatisfactory on the grounds of delay and the need to use Freon as an extraction agent. Freon is a prohibited CFC, which destroys the ozone layer, and its use in the tests is governed by special permissions under current legislation. Alternative suggested solvents present health hazards to the operator.

Commercially, laboratory testing is costly and fails to address the problem of the large volumes of possibly contaminated water, which can be discharged between sampling and test result. On-line methods have therefore been sought for many years.

The OIW2233 system utilises a special delivery system to homogenise and degas the test stream and a non-contact fluorescence detection cell (NOCELL™) capable of measuring down to 1 ppm of oil in water (well below the 40 ppm limit set by current legislation, comments the manufacturer).

The heart of the unit is a multistage centrifugal pump which delivers the homogenised and degassed sample stream (all particulate matter being reduced to 10  $\mu$ m or less) to the detector cell through a 'fast loop' at more than 8 m/s. The high flow rate keeps the system (including the detector) flushed and free from fouling.



The detector cell itself is a non-contact type exhibiting 'black body' thermal properties, through which the sample stream free falls at right angles to the fluorescent light beam. The wavelength of the beam can be adjusted to detect many other chemicals but, when used in the oil fields, is calibrated against the oil found at the site or against a synthetic standard.

Previous attempts at on-line monitoring are reported to have failed partly due to rapid fouling or contamination of the detection cell. Steptech claims that its 'no contact' design avoids those problems completely and reduces maintenance to a simple recalibration check every six months.

The monitor can be provided as a stand alone instrument on its own skid, or fitted into the control system of an installation with feedback loops capable of immediate remedial action, from sounding local or remote alarms to interrupting upstream flows.

Steptech is now in discussions with the DTI and expects that on-line monitoring will become the new standard, rather than an option.

Tel: +44 (0)1438 312425 Fax: +44 (0)1438 312111

## Acquisition expands SGS services

SGS Redwood Technical Services (RTS) has acquired from ICI the Flow Metering and Instrument Services business based on two sites in the Teesside area. The acquisition increases both the range of services available from the company and the strength of RTS's northeast England operations.

In addition to its existing capability to calibrate and maintain the majority of flow meter and instrument types, RTS can now offer process plants, oil refineries and terminals, pipeline operators and water companies:

- a comprehensive service, including the inspection, repair, calibration and hire of portable gas detectors;
- calibration of electronic and mechanical test equipment;
- construction and installation of thermocouples for specialised applications;
- hire of precision equipment; and
- planned maintenance in process installations.

Contact: John Miles Tel: +44 (0)151 350 6651 Fax: +44 (0)151 350 6650

## Using the BEST

Geoservices Testing and Well Services has introduced a new build-up evaluation shut-in tool (BEST). The tool is said to reduce the wellbore storage effect during production tests by closing the well off downhole, thereby improving data quality. The unit has a high temperature rating of 175°C and has multi-shot capability. Up to 10 openings and 10 closings, for time periods varying from 1 minute to 40 days, can be programmed into the tool from a PC prior to the job. The device can also hold pressure in both directions and can thus be used for testing both production and injection wells.

Field tested in France in 1997, the system has since been used onshore and offshore Latin America.

Tel: +33 1 48 14 85 81 Fax: +33 1 48 14 85 67

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PETROLEUM REVIEW OCTOBER 1998



## TC 67 Meets in Xi'an, China The first standards?

The 18th Plenary Meeting of ISO/TC 67 was hosted by the China National Petroleum Corporation at its Tubular Goods Research Centre in the historic capital city of Xi'an, in the Shaanxi Province of northwest China. Some 35 delegates participated in the meeting over the two days of 16 and 17 September 1998. In addition, there were a number of observers who took the opportunity to attend and learn about international standardization.

## Performance targets agreed

The UK delegation had submitted a Position Paper ahead of the meeting requesting that delegations again consider implementing performance targets as a means of achieving the delivery of standards. This was agreed by the meeting as a 'high level' management goal for the technical committee in view of the disappointing progress to date. A resolution was passed setting the committee and its sub-committees the challenging objective of publishing 20 additional standards by the end of 1999 and a further 30 by the end of the year 2000. There are some 98 standards on the active work programme and it is a 'stretch target' to publish 50 of these before the new century.

It was also agreed that a two-year plan would be developed providing the detailed listing of standards and specifically how this goal will be achieved. At that time, with the standards already published, the technical committee will have published about 75 key standards which will form the core of the standards to be used by the petroleum and natural gas industry well into the next millenium.

## Ancestors honoured

The Chinese culture is to respect their parents and elders. The Xi'an venue was therefore a fitting place to pay tribute to the contribution of a number of key individuals who have been instrumental in the process of developing standards. In particular, Neil Reeve in making a presentation to Cyril Arney, stated that: 'He has been a father to the Technical Committee since its inception in 1988 and has taken it from nothing to a growing family of some 850 people who now have a role within the team. Cyril has been responsible for defining why international standards are required, what these should be for the petroleum industry and then creating and implementing a large work programme. TC 67 has now published 24 standards and I guess, that if he has one regret, it would be that his vision would have justified more. It is important on this occasion to remember history so that the new team do not make the same mistakes again.' David Miller of the API in Washington also presented him with a Certificate of Appreciation signed by Lawrence Eicher, the Secretary General of ISO in Geneva.

Jim Heimer, the head of the US delegation, told the meeting that Cheryl Stark will be nominated by API, acting on behalf of ANSI, to the ISO Technical Management Board as the candidate for the new Chairman of TC 67. This nomination will be considered by the TMB at its January 1999 meeting and if approved, she will serve for a period of six years. Cheryl Stark has been involved with TC 67 for many years, at one time acting as convenor for the working group on drilling fluids. She is currently Industries Activity Coordinator with Amoco Exploration and Production in Houston, US. She attended the meeting in Xi'an in order to facilitate the handover. In her address to the technical committee, she stated that: 'I am committed to delivering quality standards that are easily available worldwide and widely used by industry. I will be dependent on each and every one of you to assist me with this."

Xi'an was the city chosen as the capital by the first Emperor Qin Shi Huang (about 2,300 years ago). He united the six provinces into a single country for the first time and to consolidate this he standardized Chinese characters, currency, metrology and the size of cartwheels - amongst other farsighted measures. Xi'an is now famous for the terracotta warriors discovered by two farmers in 1974 while digging a water well. There is an elaborate museum complex established on the site of the emperor's mausoleum.

## Processing equipment and systems

The article under this title in the July edition, included reference to a presentation by Marty Lesh from the API/CRE International Standards Committee. He has written to the editor to point out that unfortunately several portions of a quote attributed to him are inaccurate and one in particular is incorrect. This was due to a misunderstanding and should read: 'If and when the United States adopts an ISO standard, then API will consider dropping the associated standard.'

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# Institutewards



Dolf Grutterink joined IP Test Method Panel ST-G6A GC Simulated Distillation in November 1991, becoming Chairman in 1996. He played a major role in the development of IP Test Methods IP406 and IP PM CF SIMDIS, arranging the provision of round-robin samples, reference samples and the collation of results for round-robin programmes and then presented results back to Panel members. He is probably also in the unique position of sitting on IP, DIN and ASTM Working Groups in the simulated Distillation field, enabling the IP to stay well informed and avoiding any duplication of effort.



John Cliff has been a member of the Grease Sub-Committee IP ST-D and Chairman of Panel ST-D-1 since 1991, Since ST-D-1 was merged with ST-D-3 in 1994, he has run these Panels single-handed without a Secretary until the re-organisation of ST-C, ST-D and ST-K in 1998. He is currently Chairman of the Panel IP-ST-C-06 Physico Chemical Tests (Grease).

John has contributed greatly to the standardisation of Grease Test Methods during his time on the panels. In particular, despite dwindling resources, he has been actively involved in maintaining the panel's test methods, by keeping up-to-date with developments in industry, instrumentation and with matters in ASTM, ISO and CEN.

## IP P OF PETROLEUM

## International Conference: **Recommissioning?**

Removing, Re-Using or Recycling Redundant Offshore Facilities

#### The Netherlands: 14-15 October 1998

This international Conference, organised in association with the Netherlands Energy Research Foundation (ECN) and the IP Netherlands Branch, will focus on the practical and economic aspects of removing, re-using or recycling redundant offshore oil and gas production facilities and will give some actual examples of what has been achieved to date. These concepts are in line with the decisions announced following the agreements reached at the OSPAR meetings in Portugal in July 1998.

The two day programme covers a wide range of topics and includes two technical tours, an exhibition, poster displays and a Conference Dinner.

Who should attend?:

- Contractors
- Senior Managers
- Environmental Managers
- Health and Safety Specialists
   Regulators Decommissioning Managers
- Design Engineers Consultants
  - - Environmentalists

Facilities Engineers

The programme and registration form is now available.

## IP 🖗 THE INSTITUTE OF PETROLEUM

## Conference on Microbially Enhanced Oil Recovery

London: 4 November 1998

The use of microbes to enhance oil recovery is a controversial subject that has been with us for many decades and is generating renewed but cautious interest within the oil industry. Proponents offer an inexpensive means to increase oil production and more recently an alternative to the use of biocides as a means of controlling H<sub>2</sub>S generation.

This Conference will present the various issues associated with this technology. Speakers will present data of specific products - both whole cells and enzymes, means of testing their performance, and the view of the oil industry. The aim will be to assess the current and likely future role of MEOR in North sea oil production.

Who should attend?:

- Production Technologists and Chemists
- Reservoir Engineers
- Microbiologists
- Chemical Suppliers
- Environmental Managers

The programme and registration form is now available.

# **NE** Publications

## Energy in the UK: 1998 Market Review\*

Editor: Louis Barfe (Key Note Ltd, Field House, 72 Oldfield Road, Hampton, Middlesex TW12 2HQ, UK). ISBN 1 85765 800 0, 136 pages. Price: £435.

This report provides an overview of the UK energy market. Major changes have occurred within the industry over the years, much resulting from privatisation which commenced in the late 1980s with the gas sector, followed by similar moves in the electricity, coal and nuclear sectors. The UK gas and electricity markets are due to complete the liberalisation process by the end of 1998. The oil sector, on the other hand, remains in private hands. This publication provides a market overview on a sector by sector (oil, gas, electricity, nuclear, coal and renewables) basis and considers the political, economic, social and technological factors affecting the industry. Profiles of some of the key players in the arena are also included together with analysis of the strengths, weaknesses, opportunities and threats to the industry. It concludes with a listing of other sources of energy information.

## **Heavy Fuel Oils\***

(CONCAWE, Madouplein 1, 1210 Brussels, Belgium). 48 pages.

This report (No. 98/109) – prepared by CONCAWE's Petroleum Products and Health Management Groups – summarises currently available physical and chemical properties and toxicological, health, safety and environmental data on heavy fuel oils. All grades of heavy fuel oils are covered.

## Multiphase Technology – Technology from the Arctic to the Tropics\*

Editors: J P Brill and G A Gregory (Professional Engineering Publishing Ltd, Northgate Avenue, Bury St Edmunds, Suffolk IP32 6BW, UK). ISBN 1 86058 139 0. 435 pages. Price (hardback): £149.00 (plus 10% for delivery outside the UK).

This book is a compilation of the papers presented at the 1st North American Conference on Multiphase Technology which took place in Banff, Canada, on 10–11 June 1998. Topics covered include field measurements, separation, boosting and metering, deposits, horizontal wells and pipes, slugs and modelling.

## Derivatives Trading by Oil Companies and Airlines\*

Gilbert Jenkins (Sunningdale Publications, 1 Hamilton Drive, Sunningdale SL5 9PP). ISBN 1872 546 668. 102 pages. Price: £48. The report examines the 1997 and 1998 accounts of 31 oil companies but concludes that only a minority provide full details of their derivatives trading activities. It shows that while derivatives operations are little reported they are in fact extensive for many oil companies. The volume also details the structure of the derivatives market for crude and products, derivatives trading by oil producers and by oil consumers, and a description of a trading room and its activities. The

## Electric Vehicles – Prospects for Battery, Fuel Cell and Hybrid Powered Vehicles

report includes tables of key players in the various markets, extracts

from annual reports, references and a bibliography.

Graham Atkin and Jonathan Storey (FT Automotive, Financial Times Business Ltd, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 84083 047 6. 250 pages. Price: £485 (\$766).

This report examines the market prospects for electric vehicles (EVs). It offers a summary of the current status of EV technologies, analysing the relative strengths and weaknesses of each. It also examines how current and likely future legislation will affect both the type of EV technology to be favoured and the development of EV's' market share.

## Petroleum Well Construction\*

Michael J Economides, Larry T Watters and Shari Dunn-Norman (John Wiley & Sons Ltd, Distribution Centre, 1 Oldlands Way, Bognor Regis, West Sussex PO22 9SA, UK). ISBN 0 471 96938 9. 622 pages. Price (hardback): £175.

This reference book covers all technical aspects of petroleum well construction, including drilling trajectory and control, multilateral wells, borehole stability, gas migration, perforating, and inflow performance.

## A Colour Atlas of Carbonate Sediments and Rocks Under the Microscope\*

A E Adams and W S MacKenzie (Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, UK). ISBN 1 874545 84 7. 180 pages. Price: £24.95.

Designed as a laboratory manual, this publication acts as an aid to the identification of grain types and textures in carbonates using a polarising microscope. More than half the world's petroleum discovered to date has been found in such rocks and the petrographic study of carbonate samples is a key companion to field or core logging and a necessary precursor to geochemical analysis.

\* Available from IP Library



By the end of October 1998, the IP Library plans to make available the following databases from its web page **www.petroleum.co.uk** 

IP Library Catalogue

This lists those books held in the IP Library which have been received since 1987. Many books received earlier are also on the catalogue. However, if you are looking for an older book and cannot find it on our web database please do not assume that we do not hold it – call Liliana El Minyawi on +44 (0)171 467 7113, who will check.

- IP Periodicals Catalogue
- Lists the titles and holdings of all the periodicals held at the IP • IP Publications for Sale Catalogue
- This lists all IP publications in print which are available for sale. The catalogue provides a detailed, searchable, description of the publications as well as bibliographical details, price and information about where to obtain copies.
- International Petroleum Abstracts
   All the records published in International Petroleum Abstracts since 1995 will be available and searchable. This database should be loaded in November 1998, but will only be accessible by subscribers to the hard copy version of IPA.

A number of new publications have been added to library stock in recent months, including:

- 77th Annual Convention Proceedings. Dallas TX, 16–18 March, 1998 Gas Processors Association. Tulsa, OK, USA, GPA, 1998.
- Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2. American Petroleum Institute. 2nd Edition. API RP 500, November 1997.
- Europalub 1997: Lubricants statistics. Europalub. Rueil Malmaison France, August 1998.
- Great Yarmouth Port & Industry Yearbook. Great Yarmouth Borough Council at Yarmouth Port Authority. 9th Edition. Swaffham Norfolk UK, Compass Publishing, June 1998.

50

# **EVENTForthcoming**

## October

#### 1-9

Tehran

24th Tehran International Trade Fair Details: Peter Moist or Judy O'Dowd, The Middle East Association, UK Tel: +44 (0)1564 784999 Fax: +44 (0)1564 784499 e-mail: events@coxex.co.uk

#### 6-7

Texas Floating Production Systems: 5th World Congress Details: OCS Technology Group, UK Tel: +44 (0)1462 712049 Fax: +44 (0)1462 711889 e-mail: GroupOCS@aol.com

#### 6-7

Moscow Natural Gas Trade and Investment Opportunities in Russia and the CIS Details: The Royal Institute of International Affairs, UK Tel: +44 (0)171 957 5700 Fax: +44 (0)171 321 2045

#### 6-9

#### Kazakhstan

KIOGE '98 Details: Odette Jonkers, ITE Exhibitions Ltd, UK Tel: +44 (0)171 306 0033 Fax: +44 (0)171 306 0358 e-mail:

conferences@ite-exhibitions.com

7-9 London Improved Measurement of Bulk Liquids Details: Mike England, Abacus International, UK Tel: +44 (0)1245 328340 Fax: +44 (0)1245 323429

8-9 Hamburg, Germany Selective Oxidations in Petrochemistry Details: Ms C Jenke, DGMK, Germany Tel: +49 40 639 0040 Fax: +49 40 630 0736 e-mail: dgmk@online.de

#### 12-13 Beirut Middle East Strategy to the Year 2011 Details: APS Conferences (TS), PO Box 2501, London W5 2LR, UK

12-15 Brussels Intertanko Brussels Tanker Event Details: Intertanko, Norway Tel: +47 22 12 26 40 Fax: +47 22 12 26 41

13-14 **Budapest, Hungary** East European Refining Details: The World Refining Association, UK Tel: +44 (0)1242 529090 Fax: +44 (0)1242 529060 e-mail: wra@enexltd.infotrade.co.uk

#### 14-15

London Meeting the Challenges of Heavy Crudes Details: SMi Ltd, UK Tel: +44 (0)171 252 2222 Fax: +44 (0)171 252 2272 e-mail: erogers@smiconferences.co.uk

#### 14-16 **Cape Town, South Africa** Africa Upstream '98 Details: Global Pacific & Partners

(Pty) Ltd, US Tel: +1 281 597 9578 Fax: +1 281 597 9589

14-15 Netherlands International Conference: **Recommissioning? Removing, Re-using or Recycling Redundant Offshore Facilities** Details: Pauline Ashby, Institute of Petroleum

#### 15-17

**Brest, France** Twenty Years after the Amoco-Cadiz Details: Brest Urban Company, France Tel: +33 2 98 33 52 40 Fax: +33 2 98 33 54 54

## 19-20

Deepwater Technologies 1998 Details: IBC USA Conferences, US Tel: +1 508 481 6400 Fax: +1 508 481 7911

#### 19 - 20

London Ensuring Social and Environmental Responsibility in the Oil and Mining Industries Details: IBC UK Conferences, UK Tel: +44 (0)171 453 5491 Fax: +44 (0)171 636 6858

**Cape Town, South Africa** 19-21 2nd Annual - Africa Downstream '98 Details: Global Pacific & Partners (Pty) Ltd, Houston, Texas, US Tel: +1 281 597 9578 Fax: +1 281 597 9589

#### 20-21

Aberdeen Risk Based and Limit State Design and Operation of Pipelines Details: IBC UK Conferences, UK Tel: +44 (0)171 453 5491 Fax: +44 (0)171 636 6858

## 21-22

Moscow Invest '98 Details: Odette Jonkers, ITE Exhibitions Ltd, UK Tel: +44 (0)171 306 0033 Fax: +44 (0)171 306 0358

The Gas Chain: From Reservoir to Tip Details: Alphatania Partnership, UK Tel: +44 (0)171 613 0087 Fax: +44 (0)171 613 0094

Wiltshire, UK

#### 26-27

25-30

Madrid Latin American Power: Risk, Competition and Financing Details: CW Associates, UK Tel: +44 (0)171 704 6161 Fax: +44 (0)171 704 8440

#### 26-27

London Sakhalin Oil and Gas Details: IBC UK Conferences, UK Tel: +44 (0)171 453 5491 Fax: +44 (0)171 631 6858

#### 26-28

London Submarine Communications: The Future of International Network Infrastructure Details: IBC UK Conferences, UK Tel: +44 (0)171 453 5495 Fax: +44 (0)171 636 1976

#### 27-29

Aberdeen International Offshore Contracting & Subsea Engineering Details: Spearhead Exhibitions Ltd, UK Tel: +44 (0)1330 833381 Fax: +44 (0)1330 833505

Houston

London

Aberdeen Project 2000 in Oil and Gas Details: IQPC, UK Tel: +44 (0)171 430 7300 Fax: +44 (0)171 430 7301 e-mail: project2000@iqpc.co.uk

#### 29

Aberdeen 5th Atlantic Margin Conference Details: SREA, UK Tel: +44 (0)1227 738844 Fax: +44 (0)1227 738866 e-mail: srea@easynet.co.uk

#### 29-30

Trade, Investment and the Environment Details: Royal Institute of International Affairs, UK Tel: +44 (0)171 957 5700 Fax: +44 (0)171 321 2045

### 30-2 Nov

Reading, UK The Fundamentals of the Oil Industry Details: Petroleum Economist, UK Tel: +44 (0)171 831 5588 Fax: +44 (0)171 831 4567

30 Brussels The European Lubricants Industry: Towards the Millennium Details: Mr J Delacour, UEIL, France Tel: +33 1 46 07 79 98 Fax: +33 1 46 07 74 71

London

### 28-29

## **Membership News**

## NEW MEMBERS

Mr J A Adams, Godalming Dr J M Bauldreay, Shell Research Limited Mr P M E Beale, Kelco Oilfield Group Dr K Been, Norway Mr M Bowyer, Oil Plus Limited Mr J Creus, CLH Aviacion Dr J P Curtis, DERA Mr M L Davis, Core Laboratories Mr K W Deibler, Carter Ground Fueling Co Mr J Delia, CGL Oil Blenders Limited Mr K W Dodds, Auchterarder Mr C C Duhigg, Gas Tech Australia Pty Limited Miss M N Durand, MarketLine International Mr T Edgar, GRS/ARS Mr E C Fawkes, Grant & Livingston Limited Mr N J Fenton, Bromley Mr R P Flaxman, Oracle plc Mr A Gilotti, Kuwait Petroleum (GB) Limited Mr J Hohner, Hansa Consult GmbH Mr B Holmes, NEL Flow Centre Mr K Holubecki, Mannesman Demag Delaval Mr N W Horler, Powergen plc Mr J J Hughes, Poole Mr J Jenkins, Northland Energy Services Mrs C J Jones, Lockerbie Mr P Kallos, Enterprise Oil Italiana Spa Mr R K M Kennedy, Anglo Siberian Oil Company plc Mr B Knickel, Novus Energy Company Mr A Lawrence, Fareham Mr J Maguire, London Dr P Mathers, Physical Acoustics Limited Mr K McQuillan, Simon Storage Group Limited Mrs C Millar, Whitchurch Mr P Okonjo, Okonjo & Okonjo Consultants Ms S J Peppiatt, Oracle Corporation UK Limited Mr H G Potter, IEG Mr F Ratti, Oracle Corporation UK Limited Captain | Scally, Southampton Mr S Shepherd, London Mr I F Sivyer, Brentwood Mr K Slagle, Mobil Oil Corporation Mr M Smith, Pontefract Mr E A Solanke, Grand Prince Ventures Limited Mr P D Sparrow, Oracle Energy Mr J Talbot, Credit Suisse First Boston Mr A van Nieuwkoop, Global Marine UK Limited Ms E M Wakefield, N M Rothschild & Sons Limited Mr P J Wandless, Peter Wandless Associates Mr M J O Willacy CBE, Michael Willacy Associates Limited Dr M G Willis, Bledington Mr D G Willmore, Llandudno Mr A H Windle, East Horsley

## **NEW STUDENTS**

Mr A Chimanov, Oxford Ms S Shanmuganathan, London Mr K A Sherwood, University of Birmingham

## STUDENT PRIZEWINNER

Mr S Hiscocks, Woking

## NEW FELLOWS

#### Mr C B Cléret, FinstPet

Christian Cléret joined Elf Aquitaine in 1976, as a Refinery Engineer. He subsequently held senior positions including Executive Assistant to the Vice-President of Refining and Marketing. In 1988, he joined the International Trading and Shipping division to be in charge of crude oil and product activities with producing countries, particularly Nigeria. In 1991, he was named Chief Executive Officer of Mercier, a large French oil products distributor.

Since 1992, Christian Cleret has been Managing Director of Elf Oil UK Ltd. He is also President of the UK Petroleum Industry Association, and a Fellow of the Institute of Petroleum.

#### Dr D Simpson, FInstPet

Dr Simpson is a Chartered Chemist, a European Chemist and a Chartered Engineer. She received her higher research degree (MPhil) in 1970 and PhD in 1974, both from Northern Polytechnic as an external student and both on the analysis of additives in plastics. Currently she is one of two Principal Consultants and Partners in Analysis for Industry, as she has been since its establishment in 1975. She is an analytical and forensic scientist and expert witness in the fields of plastics and petroleum, pharmaceuticals, food and beverages – particularly with regard to matters of health and safety. While she has prepared numerous reports on investigations these have not been published because of the confidential nature of the work. She is a member of PTI/13 Technical Committee – Petroleum Testing and Terminology/IPST Test Method Standardization Committee.

## NEW CORPORATES

Merrill Lynch International, Ropemaker Place, 25 Ropemaker Street, London EC2Y 9LY, UK. Tel: +44 (0)171 628 1000 Representative: Mr C Baxter, Director

Merrill Lynch International is an integrated investment banking service company.

#### Manugistics (UK) Ltd, Manugistics House, Bracknell Beeches, Bracknell, Berks RG12 7BW, UK. Tel: +44 (0)1344 354690 Fax: +44 (0)1344 306480

e-mail: pcoxhead@manu.com

Representative: Mr P Coxhead, Snr Business Consultant Manugistics (UK) Ltd is the leading provider of software and services for supply chain management. Its solutions aid in improving the flow of product within and among companies from raw materials/parts through manufacturing to delivery of product to the end customer. Its customer-centric solutions uniquely allow clients to create and optimise their supply chains around their customers. They are quick to implement, adapt easily to change and deliver rapid results.

#### Lehman Brothers International, One Broadgate, London EC2M 7HA, UK.

## Tel: +44 (0)171 260 2524 Fax: +44 (0)171 260 2216

Representative: Wendy Anderson, Executive Director Lehman Brothers International is a full service investment bank, with strengths in fixed income, equities mergers and acquistions, and merchant banking in the US, Europe, Asia and emerging market regions.

Air Spectrum Environmental Ltd, Spectrum House, North Street, Droitwich Spa, Worcestershire WR9 8JB, UK. Tel: +44 (0)1905 798000 Fax: +44 (0)1905 798153 e-mail: air.spectrum@virgin.net

Representative: Mr M A Lovatt, Sales Manager

Air Spectrum Environmental Ltd specialises in odour control, emergency odour control, tank cleaning, degassing, waste stream stabilisation, oil recovery, pressure jetting, sludge handling and facilities management.

# **Membership News**

## NEW CORPORATES

### CSC Computer Sciences Ltd, Guild Centre Offices, Lords Walk, Preston, Lancashire PR1 1RE, UK.

Tel: +44 (0)1772 204090 Fax: +44 (0)1772 205114 Representative: Mr T Simmons, Account Manager

CSC Computer Sciences Ltd (CSC) is a world leader in the use of information to achieve business results. The company provides a range of professional services including management consultancy, business re-engineering and information systems consultancy, integration and outsourcing.

#### Cognitus Ltd, 1 Park View, Harrogate, North Yorkshire HG1 5LY, UK.

#### Tel: +44 (0)1423 562622 Fax: +44 (0)1423 567916 e-mail: info@cognitus.co.uk

Representative: Dr David Corben, Senior Consultant

Cognitus Ltd is a consultancy which specialises in system dynamics modelling and Systems Thinking. In addition to undertaking consultancy projects, Cognitus provides a full range of services for organisations interested in adopting System Dynamics and Systems Thinking; modular training courses and competency development programmes. The company is the UK's exclusive distributor of the 'Think' simulation software. As a result of the experience gained from a number of major North Sea oil field modelling projects, Cognitus has developed a System Dynamics based methodology for value based management of oil field assets, called FieldValuer.

FieldValuer provides a framework for developing a unique whole field picture of the asset. It consolidates existing models and reconciles the knowledge based in the specialist management groups, to enable quick, easy and rigorous testing of potential scenarios. The methodology is highly appropriate at the initial field appraisal (Whole Life Strategy) and late life appraisal stages of the oil field life cycle (Late Life Strategy), but can also provide unifying insights to value management at all stages of field life.

#### Innes Consultancy Plus, Forth House, 4–6 South Lumley Street, Grangemouth FK3 8BT, UK.

## Tel: +44 (0)1324 664411 Fax: +44 (0)1324 486620

e-mail: innesadmin@innes-consultancy.plus.co.uk

Representative: Mr D Ritchie, Partner

Innes Consultancy Plus supplies supervisory personnel to the petrochemical industry both within the UK and overseas, on either a contract or permanent basis. Full details can be seen at www.innes-consultancy-plus.co.uk

#### Petrochem & Marine Srvs HK Ltd, Room 6, 16/F, Block A, Hi-Tech Industrial Centre, 5–21 Pak Tin Par Street, Tsuen Wan, NT Hong Kong.

### Tel: + 852 2402 9010 Fax: + 852 2492 3786

Representative: Mr L S Au Yeung, General Manager

Petrochem & Marine Srvs HK Ltd is involved in petroleum and petrochemicals, inspectors and specialised marine surveyors and consultants for ship and all types of cargo, Services provided to oil majors, traders, P&I clubs and ship owners, insurance companies, solicitors and others.

#### Vikoma International Ltd, Prospect Road, Cowes, Isle Of Wight PO31 7AD, UK.

Tel: +44 (0)1983 284400 Fax: +44 (0)1983 299035 Representative: Mr P Tyler, Marketing Manager

Vikoma International Ltd is a world leader in the design, manufacture and supply of oil spill response equipment for marine, inland and industrial applications. The service division offers risk assessment, contingency planning, on-site training and training.

#### Hedley Purvis Ltd, Coopies Lane Industrial Estate, Morpeth, Northumberland NE61 6JU, UK. Tel: +44 (0)1670 515432 Fax: +44 (0)1670 513110

Representative: Mr Michael Rudd

Hedley Purvis Ltd specialises in the provision of mechanical joint integrity services total management of a multi-disciplinary team to provide a leak-free joint. This professional value-added service includes: bolt tensioning, flange machining and joint testing for applications in onshore, offshore – topside and subsea, – refining and power generation industries. All hydraulic bolting equipment for this service – bolt tensioners, torque wrenches and ancilliary products – which are also for sale or hire, are designed and manufactured in-house. A state-of-the-art 3D computer modelling package ensures that this range of products is constantly being enhanced. In addition, a team of highly-trained and experienced engineering technicians is available for all on-site bolt-working requirements.

#### Armstrong Technology Associates, Swan Hunter House, Station Road, Wallsend, Tyne & Wear NE28 6HQ, UK. Tel: +44 (0)191 262 3964 Fax: +44 (0)191 262 2833

Representative: Mr G Mackie, Technical Director Armstrong Technology Associates is a marine design consultancy specialising in the offshore oil and gas sector.

#### Thompson Camichael Ltd, Great Bridge Road, Bilston, West Midlands WV14 8NP, UK.

Tel: +44 (0)1902 353141 Fax: +44 (0)1902 405509 Representative: Mr Paul Pearson, General Sales Manager

Thompson Camichael Ltd designs and manufactures road tankers in aluminium, stainless and carbon steel. Suitable for the transportation of petroleum, oil, food products, waste products, milk, building material, plastics, chemicals, aircraft fuels etc. The company also provides worldwide exports from the UK, US, Thailand and South America.

#### IP Chemical & Petroleum Service Ltd, Cleary Court, Church Street East, Woking, Surrey GU21 1HJ, UK. Tel: +44 (0)1483 776767 Fax: +44 (0)1483 770004

Representative: Mr Gary Whittle, Operations Director

IP Chemical & Petroleum Service Ltd supplies fully trained professional drivers to various petroleum and chemical companies to assist in managing volatile seasonal and volume related businesses, although special emphasis is placed upon complete company outsourcing. It employs full-time experienced personnel to ensure continuity of employees and offers proactive and innovative solutions which have continually proved to be beneficial to all clients.

#### Trans-Atlantic College, Metropolitan Centre, Kingsland Road, London N1 5AZ, UK.

Tel: +44 (0)171 275 9946 Fax: +44 (0)171 275 9947 Representative: Dr Prince Efere, Principal Trans-Atlantic College is involved in education and training.

## Around the Branches

A full listing of Branch events is available on the IP website:

## www.petroleum.co.uk

or, if you require further information please contact your individual Branch Secretary.

53

## **IP Conferences and Exhibitions**

## International Conference on

## The Future of Transportation Fuel Quality in Europe

## London: 12-13 November 1998

In recent months, there has been considerable debate and discussion within the Commission and Parliament of the European Union, the automotive industry and the oil industry, on the quality of transportation fuels required by 2005 to contribute to meeting European Air Quality Standards.

This major international Conference organised in association with the French Association of Petroleum Technicians and Professionals (AFTP) and the German Society for Petroleum and Coal Science and Technology (DGMK) will bring together representatives from the European Commission, UK Government, the oil and automotive industries, environmentalists and academia to present their views on current and future legislation, the inter-relation between automotive vehicles and fuels and their impact on the environment, and the implications for the European refining industry.

The programme and registration form is now available.

## Information for Energy Group Autumn Conference

## Information Control – The Key to Success in the Energy Industries London: 19 November 1998

Organisations are ever more aware of the value and importance of information – whether held in electronic or hard copy form or in the heads of their employees.

This Conference will address the practical implications of controlling information, including legal aspects, storage and retrieval issues, and knowledge management.

- Knowledge Management
- Intranets
- Records Management
- Legal Issues
- Hard Copy

## Who should attend?

This is an important Conference for anyone involved in the management or provision of information, such as Knowledge Managers, Information Officers, Librarians, Records Managers, Consultants, their Managers and anyone else responsible for information within their organisation. It will provide an excellent opportunity to hear the latest expert opinions and to network with colleagues and fellow professionals.

The programme and registration form is now available.

## Autumn Luncheon

London: 30 November 1998

## Guest of Honour and Principal Speaker: His Excellency Sheikh Ahmed Zaki Yamani

Former Minister of Petroleum and Mineral Resources for Saudi Arabia, 1962–1986.

The Institute of Petroleum is launching its first annual Autumn Lunch in London on Monday 30 November 1998 with Guest of Honour and Principal Speaker, His Excellency Sheikh Ahmed Zaki Yamani, Former Minister of Petroleum and Mineral Resources for Saudi Arabia and Chairman of the Centre for Global Energy Studies.

We are confident that this Autumn Lunch will become an established date in the oil and gas calendar of events and will provide a unique opportunity to meet colleagues and to hear internationally renowned figures speak on the issues influencing our global industry today. It is expected therefore that many companies will purchase tables and maximise the opportunity to entertain guests at what we hope will become one of the key social events in the industry year.

Tickets are limited so early application is recommended

## International Conference on

## Dispute Resolution in the International Oil and Gas Industries London: 4 December 1998

organised with the support of the UK Energy Lawyers Group

In the four years since the IP and UKELG last held a joint conference on this topic there have been many developments both of procedure and of subject matter affecting the resolution of disputes in the international oil and gas industries.

This Conference will review the principal features of the Arbitration Act 1996, the increasing international use of Mediation as an alternative to litigation, the use of the Final Offer Arbitration and some possible techniques for minimising and avoiding disputes.

The programme and registration form is now available.

## Next year

## **IP Week 1999**

### London: 15–18 February 1999

The ticket application form for the Annual Dinner is printed on the inside back cover of *Petroleum Review*.

The full programme for all events in IP Week 1999 will be available this month.

For programmes and registration forms please write or fax: Pauline Ashby, Conference Administrator, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK Tel: +44 (0)171 467 7100 Fax: +44 (0)171 255 1472 e-mail: pashby@petroleum.co.uk

## **Diary Dates**

## **Energy Economics Group**

## 'Key Energy Policy Issues'

Thursday 8 October 1998, 17.00 for 17.30-19.00

Anna Walker, Director General, Energy, Department of Trade & Industry

IP Contact: Jenny Sandrock

## London Branch

## 'City Fuels'

Wednesday 14 October 1998, 17.15 for 18.00

Tamara Early, Managing Director, Greenergy UK Ltd and Andrew Owens, Managing Director, Greenergy International Ltd

Tea and biscuits will be served at 17.15. Light refreshments will be available afterwards.

IP Contact: Mrs C Reader, Tel: +44 (0)181 852 9168

## **Energy Economics Group**

## 'Emissions Trading: the Precedents, the Policies, and Likely Developments'

Thursday 22 October 1998, 17.00 for 17.30–19.00 Richard Ward, Executive Vice-President, International Petroleum Exchange IP Contact: Jenny Sandrock

Energy Economics Group and Exploration & Production Discussion Group

## 'How soon will oil production peak?'

Wednesday 25 November 1998, 17.00 for 17.30 - 19.00

Colin Campbell, Associate Consultant, Petroconsultants

IP Contact: Jenny Sandrock

All meetings are held at the Institute of Petroleum unless otherwise stated. Please tell the IP contact if you plan to attend any of these free meetings. Tel: +44 (0)171 467 7100

OF PETROLEUM

**New publication** 

## Model Code of Safe Practice in the Petroleum Industry Part 2: Design, Construction and Operation of Distribution Installations

This Code replaces the 1987 edition of the Institute of Petroleum's *Marketing Safety Code*. Its purpose is to provide a general guide to safe practice in the planning, design, construction, operation, maintenance and decommissioning of distribution installations and their equipment.

All aspects of safe practice are covered, including fire precautions, health, welfare and protection of personnel and training. The new Code has been compiled by the IP's technical committee, which comprises experts from BP Oil UK, Esso Petroleum, Fina, Gulf Oil UK, the Independent Tank Storage Association, and Shell UK. The guidance is relevant to all bulk storage and distribution facilities, including refineries, terminals, government storage, and facilities operated by consumers.

ISBN 0 85293 204 9 25% discount to IP Members

Available for sale from Portland Press Ltd at a cost of £70.00 inc. postage in Europe (outside Europe add £5.00). Contact Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP. Tel: +44 (0)1206 796 351. Fax: +44 (0)1206 799 331. e-mail: sales@portlandpress.co.uk

For a complete and up-to-date listing of all IP publications see our web site: www.petroleum.co.uk

# MOVESople

As part of a new realignment of its Executive Committee, ABB has appointed three new members to its Group Board of Directors. They are **Kjell Almskog** as head of the Oil, Gas and Petrochemicals segment, **Jörgen Centerman** as head of the Automation segment, and **Jan Roxendal** as head of Financial Services. Each will have the title Executive Vice-President.

**Steinar Kleven** has become Senior Vice-President, Exploration and Production, of Zurich Global Energy, based in Bermuda. He was formerly Senior Underwriter and Manager of the energy department of Zurich Protector in Norway and has 22 years' experience in the areas of marine and energy insurance.

Arco has elected **Kevin O Meyers**, President of Arco Alaska, as its new Senior Vice-President. He will now be based in Los Angeles. Meyers joined Arco in 1980 as a Senior Research Engineer and has held various senior posts within the company.

**Gordon A Mapp** is the new President of the Air Compressor Group of Ingersoll-Rand. He joins the company from Thermo King, which was acquired by Ingersoll-Rand late last year, where he was Vice-President and General Manager of the company's North American Division.

Racal Survey has appointed **Professor C D Green** as Director of Strategic Development. A leading industry expert in highresolution seismic, site surveys and shallow marine geoscience, Green also has strong commercial and business skills developed from more than 20 years with Shell.

Expro Group has named **Terry Charleton** as Client Account Manager responsible for the UKCS/Norway region. He has been with the company for three years, and has 12 years' experience in the upstream industry, gained from North Sea operations.

**Steve Day** has joined Moore Process Automation Solutions as Oil and Gas Industry Manager. He was previously Account Manager for the Oil and Gas Industry with Honeywell, and is currently Vice-Chairman of the London Section of the Institute of Measurement and Control.

**Peter Solomon**, UK and Ireland Account Manager for DuPont Safety and Environment Management Services (SEMS), has now taken on the post of Regional Oil and Gas Industry Manager.

North Star Energy has appointed Robbie Ord (top) as International Sales Manager and Ross Allen (below) as Sales Representative with responsibility for UKCS activities. Ord has more than 25 years' international experience in the oil and gas industry in a range of senior managerial positions. He joins North Star following a threeyear spell as Operations Manager with a leading Aberdeen-based petroleum services concern. Allen joins the company following a spell in the Middle East with the **Oman Refinery Company.** 



Charles Henderson is the new Chairman of TOTAL Oil Marine and TOTAL Oil Holdings. He was previously Director-General for Energy at the UK Department of Trade and Industry, and is also a member of the Monopolies and Mergers Commission. Henderson replaces *Sir Philip Jones* who was Chairman of TOTAL in the UK from 1991 to 1998 and who is now retiring from the company.



In the course of his career he has been involved in a number of key UK energy market developments. These include: the establishment of British National Oil Corporation (BNOC) (1975–80); review of the coal industry (1992–93) and the privatisation of British Coal; the first stages of opening up the UK domestic gas market; review of nuclear power in the UK (1995) and the privatisation of British Energy; and, the creation of the Centre for Marine & Petroleum Technology (CMPT).

**Keith Blundy** has assumed responsibility for Whessoe Varec's international R&D programme as the company's new Technical Director. He will also function as Group Technology Coordinator for the companies controlled by parent company Whessoe, which provide equipment and services to the oil and gas industry and other industrial sectors. Blundy was previously Tank Gauging Business Unit Manager for Whessoe Varec.

Three new Business Managers are to join Fina's lubricants team. Ian Thurloway (top) joins the company from Esso, where he was responsible for developing the automotive lubricants sales business. Steve Mahoney has much experience working in the automotive lubricants market for BP in Australia where he was responsible for distributor, commercial and industrial lubricant sales. Paul Butler (below) joins the company from Q8. He has more than 20 years' experience in the oil industry.



Senior Shipping Analyst **Fred Doll** has joined the Board of international shipbrokers H Clarkson & Company. Until the end of last year he was at Exxon Company International in New Jersey.

**Dee Maclean** has taken on the newly created post of Marketing Co ordinator for BJ Services' Process and Pipelines Division. She will be responsible for handling all marketing communications activities surrounding BJ PPS, and joins the company from Petrodata of Aberdeen.



## Annual Dinner 1999 Grosvenor House, Park Lane, London W1

## Wednesday 17 February 1999 at 18.45 for 19.30

- Tickets can only be purchased by Individual Members and Corporate (Company) Members of the Institute of Petroleum (IP).
- The price of a ticket is £132.00 plus VAT for Individual Members and for nominated representatives of Corporate Members, and £180.00 plus VAT for their non-Member guests. Full payment must be received before tickets can be guaranteed.
- Individual Members may apply for a maximum of five tickets. Corporate Members may apply for individual tickets, or for one or more complete tables of 10 places.

It is the responsibility of applicants to establish whether or not their guests are Individual Members. Corporate Members should note that only the company's nominated representative to the IP is entitled to the reduced rate, other employees or guests must be paid for at the non-Member rate, unless they are Individual Members in their own right.

 Applications should be made by completing the form below and sending it to The Institute of Petroleum, with the full remittance, by Friday 23 October 1998. Applications received after 23 October 1998 will be considered separately.

- Companies or individuals wishing to share tables must state this when completing the application form, as changes cannot be made after tickets have been allocated.
- Tickets will be allocated and mailed during the week of 9 November 1998. Please note that the IP may be unable to meet requirements in full, and we suggest therefore that you do not invite guests until you have received your tickets. In the event that the Dinner is oversubscribed, allocation of tickets will depend on the degree of the applicant's involvement in IP affairs, and a waiting list will operate. Full refunds will be made as appropriate.
- Successful applicants should submit a confirmed guest list to the Institute of Petroleum by Friday 22 January 1999 at the latest, as names submitted after this date cannot be included in the printed programme.
- In the event of cancellation, a refund less a 20% administration charge of the total monies paid will be made provided that notice of cancellation is received in writing on or before 8 January 1999. No refunds will be paid after this date.
- Dress will be black tie with decorations.

The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK. Tel +44 (0)171 467 7100 Fax +44 (0)171 255 1472 A charitable company limited by guarantee. Registered No 135273, England

TICKET APPLICATION	FORM	-	NETITITE
	11	OF PI	ETROLEUM
	Grosveno Wed	Annual Dinne r House, Park nesday 17 Fel	er 1999 Lane, London W1 pruary 1999
To: Pauline Ashby, Conferen	ce Administrator, The Institute of	Petroleum, 61 Nev	v Cavendish Street, London W1M 8AR, UK. Fax No. +44 (0)171 255 1472
I wish to order tic My application is made as a	ket(s) and enclose my remittance n Individual Member/on behalf o	*, made payable to f a Corporate Mem	The Institute of Petroleum. ber (delete as appropriate).
Individual Members	ticket(s) @ £132.00 each	= £	
Non-Members	ticket(s) @ £180.00 each	= £	
	+ 17.5% VAT	= f	Total= £
		-	IP Membership No.**
Company		_Address	
Tel/Switchboard:		Tel Direct:	Fax:
Signature		Date	
I confirm that I have read and ag	gree to the terms and conditions detail	ed above.	
	PL * Payment should be made by ste ** Please telep	EASE PHOTOCOPY rling cheque or draft none the IP Membersh	<b>THIS FORM</b> drawn on a UK bank. This is not a tax invoice. Iip Department if unknown.

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