

Petroleum review

JANUARY 1999

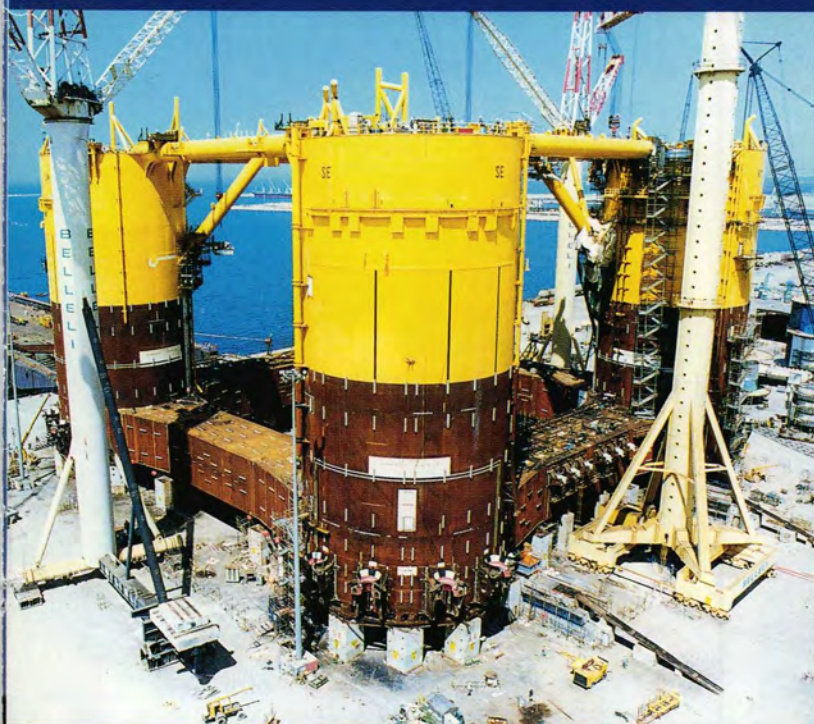
Prospects '99

- Opec Strategy

Sheikh Yamani speaks at the IP's first Autumn Luncheon

- Fabrication

European construction yards facing bleak future



- Middle East

The Gulf suffers

- United States

A silver lining deep down

Health & Safety

Managing the business of safety

Industry Mergers

Who is, who isn't, and who was

Covering the international oil and gas industry from field to forecourt – exploration, production, refining and marketing



THE INSTITUTE
OF PETROLEUM

IP Week

15-18 February 1999

Monday 15 February

International Conference on

Financing the International Oil Industry – The Challenge of Major Projects



Stephen Hodge

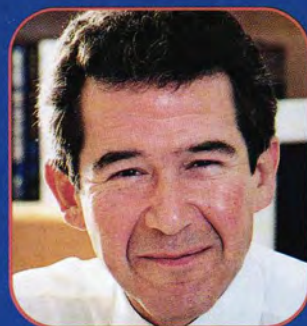
Tuesday 16 February

Annual Luncheon

'The Century of Choice'

Guest of Honour and Speaker:

Sir John Browne,
Chief Executive,
British Petroleum
Company plc



Sir John Browne

Workshop on

Knowledge Management in the Oil and Gas Industry – Trends and Case Studies

Organised in association with **ARTHUR ANDERSEN**

London Branch Evening
Discussion Meeting

Sakhalin Oil & Gas – Exploration of the East Sakhalin Shelf

Paul Nixon, Sakhalin Project Manager
G&G, Vice-President Texaco
Exploration Sakhalin Inc

Wednesday 17 February

The 12th Oil Price Seminar and Exhibition on

Crude Oil Pricing in Deregulated Markets in Asia

Supported by



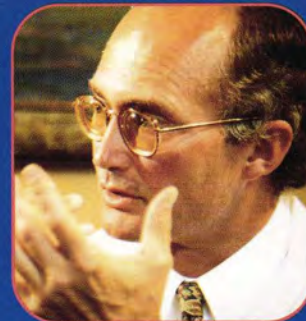
Thursday 18 February

International Conference on

The Caspian Region: The Major Oil and Gas Play for the Next Decade



Sir Malcolm Rifkind



Steve Remp

Participants are advised to register early as places are limited.

The IP Week 1999 Programme of Events and registration form is available from
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ABBREVIATIONS

The following are used throughout *Petroleum Review*:

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

No single letter abbreviations are used.

Abbreviations go together eg. 100mn cf/y = 100 million cubic feet per year.

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Front cover:

Top picture: Ian Ward, Director General of the IP (left) and Chris Moorhouse, President of the IP (right) greet Sheikh Yamani (centre) at the Institute's first Autumn Luncheon. Photo: Emma Parsons

Bottom picture: Ursa TLP hull constructed by Belle li Offshore



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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.

ROUNDUP

From the Editor

The low price realities of 1999

History will record January 1999 as the date that the euro was launched on to the world financial stage. The potential savings, once the euro's stability and value are established, will be enormous for the oil and gas industries. Common pricing across Europe, harmonised internal accounting, common salary and remuneration scales and directly comparable share quotations are all likely.

From January, oil and gas companies will have enormous euro earnings. To date oil producers have always priced their oil and been paid in dollars. Now for the first time they will have a potential alternative as it seems inevitable that the euro will become a major international trading currency. How quickly remains to be seen.

As 1999 opens, oil prices hover around \$10/b for Brent and \$11/b for WTI – levels universally described as impossibly low. There has been no year in which January prices were lower than those in March, so the outlook is poor.

Already the pain is palpable with oil companies merging or reducing manpower or both at once, while producer nations record with mounting horror the deterioration in their national finances. Two items encapsulate the state of the industry at the end of 1998, the news that the two largest oil companies in the US are to merge and the news that Saudi Arabia is to borrow around \$5bn from Abu Dhabi to help bridge its budget deficit.

The times and the oil price appear very unnatural and all too many people expect some miraculous reversal in the price to come to the rescue. While not impossible this seems most unlikely for three reasons: historical trends; the size of Opec's spare capacity; and the lack of concern by western governments about the oil price level.

Examination of oil prices in real terms (not as difficult as it sounds; BP's excellent statistical review prints it in constant 1997 \$) shows that real prices were on a declining trend from 1863 to 1970. This was followed by the more recent dramatic Opec-induced rise and decline. Prices are certainly very low at the moment: the only other times they have been below \$10 were in the Great Depression, the Second World War and the mid/late 1960s. It is reasonable to expect some price recovery as excess stocks are worked off but as real prices never even reached \$15/b between 1930 and 1970, history suggests the upside is limited now that Opec's market power is so clearly broken.

Opec currently has installed capacity of around 31mn b/d and in October 1998 was producing around 27mn b/d. Latest International Energy Agency (IEA) projections are that in 1Q1999 the call on Opec production will be 27.9mn b/d falling to 25.4mn b/d in the second quarter. This seems to imply further cuts just to maintain prices.

At the moment consumer governments are happy that low energy prices are restraining inflation. The sort of deal that happened in 1986 is probably impossible and is unlikely to be even contemplated until things get much worse. Energy supply fears currently barely feature on government agendas.

Sheikh Yamani speaking at the IP's recent lunch (see p18–20) clearly spelt out the new realities for the Opec producers and raised the real, but terrifying, idea that Opec may have no interest in getting prices back up to levels that justify investment on non-Opec production. For the companies the immediate prospects are bleak and the merger and takeover wave seems set to continue in 1999.

To date the emphasis has been on taking out costs. The market's judgement is that BP/Amoco and Exxon/Mobil are good, but TOTAL/Fina less so, while Texaco and Shell have abandoned their European downstream merger before it even got going (it had been heavily criticised by financial commentators). Whether Texaco's recent talks in Saudi Arabia are about more than investment in gas projects remains to be seen. As does the stock market's judgements six months from now.

An interesting idea that smaller, national oil companies could become national energy suppliers is raised in the article on p26–27 along with the suggestion that tightening environmental standards could be a positive rather than a negative for downstream margins.

1999 promises to be an exciting and turbulent year for the industry and many, unfortunately, will lose their jobs as the industry is transformed to cope with the new realities. The British Navy when confronted with the problem of too many captains for the requirements of peace after the Napoleonic Wars kept those it wanted available (including Nelson) for recall, on half pay. In the early-1990s recession the oil industry lost too many key staff and came to rue the loss. Could a variant of the Navy's approach improve things this time round?

Chris Skrebowski

PS. See inside front cover for full IP Week details.

Web World

The growth of the World Wide Web has made access to all areas of the industry much easier, and the physical location of an organisation is becoming increasingly irrelevant. Many institutes and other industry bodies have developed their own websites for disseminating information.

The American Petroleum Institute site (www.api.org) is well-established and contains a huge amount of information including news, education and publications. Its primary aim is to represent the nation's oil and gas industry, so the focus is just on the US.

Moving southwards, the Australian Institute of Petroleum (www.aip.com.au) and Australian Petroleum Production and Exploration Association (www.appea.com.au) are useful sources for facts and figures, as well as educational material. Many of the publications can be downloaded in PDF format.

Surprisingly, the Institut Français du Pétrole's site (www.ifp.fr) is all in English with a very discreet link to a French version. This gives it an international feel, and there is good coverage of how the IFP interacts with Europe and the rest of the world. The IFP describes itself as a 'research and development, training and information centre at the service of the oil, natural gas and automotive industries'. The graphics are a little heavy, but a text-only version is available.

Unfortunately you will need a 19-inch monitor in order to view the International Energy Agency's website (www.iea.org) properly. However, once you get past the home page there don't appear to be any visibility problems. Those who persevere will be rewarded with detailed statistics, publications, news, and advice on the dreaded Millennium Bug. The Agency is closely linked with the Organisation for Economic Co-operation and Development (OECD) which has its own website (www.oecd.org).

The E&P Forum has produced a very well designed and attractive website (www.eandpforum.co.uk). There is a wealth of information on worldwide exploration and production, including downloadable accident statistics. For those of us who have forgotten how to use a pen and paper, the Forum's publications can also be ordered online.

The IP website (www.petroleum.co.uk) carries links to all of the above sites and many more. Our site includes full details of all the Institute's activities, along with industry news and information.

If you have any questions regarding the IP website or the Internet in general, please contact Catherine Pope – cpope@petroleum.co.uk

Stolt Comex Seaway secures contract hat-trick

Stolt Comex Seaway has secured three contracts for projects in 1999 and 2000 in the North Sea and Irish Sea with a total value of \$41mn. The first is a subsea EPIC contract from Burlington Resources Irish Sea for the development of the Dalton project in the Irish Sea and is valued at \$25mn. The Dalton subsea wells will be tied back to the North Morecambe platform by 6.9-km rigid flowlines and well control umbilicals which are to be installed in 100 feet of water by the *Seaway Falcon* and *Seaway Eagle*. Work was due to begin in December 1998.

The second contract is for Saga Petroleum's North Sea Tordis field. Valued at \$7mn, the contract covers the installation of a water injection template together with production and water

injection flowlines and an electrical control umbilical. Installation is scheduled to commence in September 1999, with the *Seaway Eagle* installing the 220-tonne template in a 600 foot water depth. Survey and tie-in work will be undertaken by the *Seaway Kingfisher*.

The remaining contract, valued at \$9mn, was awarded by Norsk for its Øseberg South development in the North Sea. The first phase of the programme is an EPIC contract for the installation of a 14.3-km well control umbilical at 330 foot water depth in 2000. There are four additional optional installation programmes for similar work covered by the contract, which may be exercised over the period 2000 to 2002.

Statoil set to improve recovery rates

Statoil plans to improve the recovery factor for its Veslefrikk North Sea oil field from 48% to 57% with the aid of modern drilling and well technology, including the use of sidetrack wells.

The use of simultaneous injection of water and gas to enhance recovery is also being assessed, as well as the potential for low-pressure production.

Around 65mn barrels of oil have been identified in addition to the basic estimate of 343mn barrels of recoverable field reserves.

The average recovery factor for Statoil-operated fields offshore Norway is currently 48.4%. However, the company plans to increase this to 54.3% by 2005.

Break-up of Brent Spar begins in earnest



Dismantling of Shell Expro's Brent Spar storage and offloading buoy has begun. Phase 1 is the removal of the 1,600-tonnes topsides by Heerema's *Thialf* floating crane at the Spar's mooring at Vats in Norway.

The control and accommodation superstructure will be taken ashore to

be scrapped and dismantled at Vikaneset near Hjelmeland, northeast of Stavanger.

Phase 2 will be the progressive raising of the hull, which will be cut into rings, cleaned, placed on the seabed at Mekjarvik, filled with ballast and covered with concrete to form a new quay.

In Brief

United Kingdom

Mobil North Sea's 9/13b-N4y horizontal well in the Nevis field in the northern North Sea has come onstream. Tied back to the Beryl Bravo platform, the well is expected to recover 3.4mn barrels of oil and 3.6bn cf of gas, increasing total Nevis field production from around 27,000 b/d to 37,000 b/d.

The UK Offshore Operators Association (UKOOA), which represents 35 oil and gas companies operating in UK waters, has published its first environmental report. The report gives an industry perspective on current environmental issues of significance, including the first quantified statement of discharges and emissions from offshore installations and onshore terminals.

The UK Department of Trade and Industry is reported to be planning to form a government-industry taskforce which will look at ways of keeping the UK's offshore oil and gas industries competitive despite the impact of low world oil prices. The taskforce is expected to be chaired by UK Energy Minister John Battle.

Bow Valley Petroleum has acquired from Mobil North Sea a 25% stake in the Victor gas field, a 20% interest in the mature North West Hutton oil field (including a 2.8% production entitlement from Q West) and 0.5% of the Hudson field. The package of assets has estimated net recoverable reserves of 11mn boe, of which 60bn cf are gas. Bow Valley is also to acquire a 9% stake in block 16/18 and 25% in blocks 19/5 and 20/1, each of which are located adjacent to existing company-owned interests.

Europe

The Norwegian Government has announced that it will launch its 16th oil production licensing round in 2000. The round will include acreage in the Haltenbanken and Donnaterrassen areas, as well as blocks located close to discoveries made by that date.

Statoil is planning to install what it says is the world's first subsea separation facility on the Troll project in 340 metres of water in 1999. The facility will separate water from the well-stream on the seabed and pump it back into the reservoir.

Strong FPS demand set to continue

The international oil and gas industry is currently considering the installation of 135 floating production systems (FPSs) over the next five years, according to UK analyst Douglas-Westwood Associates. Only 75 such units have been installed in the period 1994 to 1998.

The company reports that Petrobras is the leader of the pack, with 27 units being considered, although 'virtually all the majors have significant numbers planned'. Looking ahead, the company expects a continuing strong demand for FPSs, for a number of reasons including:

- the depletion of fields in depths to 100 metres that were readily accessible to traditional fixed platforms;
- the increasing numbers of remote

field locations for which the floater is well suited;

- the ease of decommissioning compared with fixed platforms – a major consideration since the Brent Spar furore;
- the potential for re-use – unlike conventional platforms, FPSs can be easily relocated and have a good residual value so they are well-suited for leasing.

Douglas-Westwood also states that over the next five years it expects 90% of the world's deepwater capital expenditure to be associated with FPSs. However, the company stresses that there are at least 83 prospects for FPSs in water depths of less than 250 metres.

Equatorial Guinea licensing round announced

Equatorial Guinea has opened a deep-water licensing round. Petroleum licensing will be under the new Hydrocarbons Law (Nov 1998) and Model Petroleum Production Sharing Contract which have flexible terms.

The new law fixes royalty at a minimum of 10% and a maximum of 16%. Bidders are invited to define the royalty increments between these limits relative to daily production rates. The new Model Contract differs from previous versions where production sharing was based on a rate of return formula. The new contract adopts a more conventional approach with a cost oil limit and then resultant profit

oil being shared in steps according to cumulative production. Bidders are invited to specify these parameters.

The deepwater region is covered by 7,800 km of non-exclusive seismic data recently acquired by Western Geophysical. A package containing historical well data and reports, regional seismic data which will enable wells to be tied to the Western Geophysical deepwater survey, infill seismic data over the Rio Muni Shelf and a comprehensive interpretation report on the petroleum geology and prospectivity of Rio Muni is also available.

The closing date for receipt of bids is 10 May 1999.

Ranger Oil unveils capital spending plan

Ranger Oil is planning a capital expenditure programme in 1999 of \$145mn. Development and exploration expenditures have been budgeted at \$90mn and \$55mn respectively, compared with anticipated 1998 net expenditures of \$220mn.

Development expenditures are to be directed at maintaining or increasing oil and gas production in the UK North Sea at Ninian, Anglia, Pierce, Kyle and the Columba fields. In Canada, up to 20 gas wells are planned at Helmet in northeast British Columbia with further gas drilling expected in East Central Alberta.

The company also plans to continue its exploration efforts in 'high-impact areas where large reserve additions are possible'. In Canada, the Ft Liard region in the Northwest Territories will be the main focus with the drilling of a

follow-up well to the P-66A gas discovery made earlier in 1998. In the US Gulf Coast, an onshore oil and gas play at Hoskins Mound in Texas will be the centre of drilling activity.

The West of Shetlands area, where Ranger recently made a 'potentially significant oil and gas discovery', will see the drilling of two exploration wells and one appraisal well. A major 3D seismic programme is planned on deepwater block 19 offshore Angola.

In the Côte d'Ivoire, where the company has a large acreage position, 3D seismic is planned on the Espoir field and a number of adjacent prospects.

Production in 1999 is expected to increase overall by 30% over 1998, with Banff, Pierce and Kyle coming onstream in the UK North Sea and a full year of production from Kiame in Angola.

North America

Global Marine has signed a \$144mn, three-year contract to provide the Glomar Arctic 1 drilling rig to EEX Corporation for deepwater operations in the Gulf of Mexico. The rig, which is currently outfitted for drilling high-pressure/high-temperature wells in water depths to 2,800 feet, will be upgraded to 3,400 feet.

Chevron is reported to have cut its projected deepwater exploration and production budget by between \$50mn to \$100mn this year due to low oil prices.

Middle East

Amoco, Occidental Petroleum and Neste Oy are understood to be planning to jointly explore and develop natural gas in northern Oman. The companies plan to develop gas fields, a gas gathering system, processing plant and distribution network to Sohar city and Amoco's gas hub in Sharjah.

Russia & Central Asia

A consortium including Lukoil is understood to have decided to end its operations in Azerbaijan following its third unsuccessful well on the Karabakh prospect this year. Lukoil has a 12.5% direct stake in the project and owns half of LukAgip's 45% interest.

Russian crude oil production fell by 0.9% in the first ten months of 1998, according to the United Financial Group's Russia Morning Comment. October output rose compared with September, but was still down 1.2% against October 1997. The Group expects to see a maximum total production loss in 1998 of between 3% and 5%.

It is understood that Lukoil is to transfer its 15% stake in the Karachaganak gas and condensate field in Kazakhstan to Lukarco, its joint venture with US company Arco.

Amoco is understood to be considering the sale of its stake in the Timan-Pechora field in northern Russia following the company's merger with BP.

Gazprom and Lukoil are reported to be on the brink of forming a strategic alliance in order to cut upstream costs and exploit new hydrocarbon resources both at home and abroad.

Expansion plans for North Sea Captain field

As part of its plans to expand its existing Captain field in block 13/22a of the North Sea, Texaco North Sea UK has awarded a £100mn contract to Kvaerner Oil and Gas for the engineering, construction and installation of a process and utilities platform.

The £350mn Captain field expansion plan, subject to final approval by the UK Department of Trade and Industry, will result in an increase in production from the current 60,000 b/d to an average plateau rate of 85,000 b/d through the

development of the reservoir within the eastern part of the field (Area B). Investment is expected to enable the field to continue producing for a further 20 years.

Installation of the new facilities and the commencement of a development drilling programme are scheduled for summer 2000, with first oil from Area B expected later the same year. The new process and utilities platform will be bridge-linked to Captain's existing Area A wellhead protector platform.

Russian field ratification

Ramco Energy has received ratification from the state Parliament of Azerbaijan for the Muradkhanli production sharing agreement. The independent energy company can now proceed with a rehabilitation programme in the Muradkhanli acreage, which includes the Muradkhanli, Jafarli and Zardab fields and is believed to hold Azerbaijan's largest onshore field.

Two new wells are planned to be drilled during the 2H1999 and new incremental oil is expected by the middle of 1999. Ramco's feasibility study of the 565 sq km acreage concluded that there are at least 5bn barrels of oil in place.

Dual heavy lift ops



Two of Smit Transport & Heavy Lift's large floating sheerlegs – Taklift 4 and Taklift 7 – have performed the lifts for the Borgland Dolphin which is currently being converted at Harland and Wolff's yard in Belfast. The former semisubmersible accommodation vessel is being converted for drilling duties in the North Sea.

News in Brief Service

Keep abreast of the most recent developments, deals and contracts in the global oil and gas industry with *Petroleum Review's* News in Brief Service.

www.petroleum.co.uk

Talisman sets sights on North Sea safety

Talisman Energy (UK) has replaced the standby vessel for its Beatrice Alpha and Bravo platforms in the North Sea with three ERICs (Emergency Rapid Intervention Craft). It is said to be the first time that an operator in UK waters has used such fast rescue craft for standby purposes – they have already been used by BP for its Norwegian Ula and Gyda platforms.

Two of the 40-foot, self righting craft – which can achieve speeds in excess of 40 mph – are housed on Beatrice Alpha, with a third based on the normally unmanned Bravo platform.

Talisman states that the £2mn investment will improve incident response

times, allow direct ship-to-shore transfers of personnel, and provide cover for the platforms in worse weather conditions than offered by traditional standby vessel cover. As part of the investment programme, the oil company has installed a new fixed radar system on the Alpha platform, which is linked to computerised monitoring equipment to watch shipping movement in the area. The company has also purchased 60 personal location beacons which will be used on the platform for the first time. This will allow the radar systems onboard the ERICs to electronically locate any personnel in the water leading to quicker retrieval times.

It has been reported that investment in the Sakhalin 1 and Sakhalin 2 projects may fall by 20% in 1999 due to an absence of production sharing legislation which has yet to be passed by the Russian Duma.

Latin America

Trinidad and Tobago is understood to be planning to re-offer three offshore blocks – U(b) and S11(a) off the east and south coast, and block 1 in the northern Gulf of Paria on the west coast – in early 1999. Some modifications have been made to the contracts covering blocks U(b) or S11(a) in order to make them more attractive, as no bids were received for them when first offered in 1995.

British Gas and Texaco's Starfish-1X discovery well offshore Trinidad is reported to have tested at 16.2mn cfd of gas.

Harken Energy Corporation is to acquire Vancouver-based Parkcrest Exploration's 25% interest in the Alcaravan and Miradores blocks in the Llanos Basin of Colombia for an undisclosed sum.

Shell and partners have plugged and abandoned the Fitzroy-1 well in Tranche B offshore the Falkland Islands.

Asia-Pacific

Mobil is reported to have made a further gas discovery in the Gorgon area of the Carnarvon Basin, offshore Western Australia. The find is expected to improve prospects for the proposed Western Australian Petroleum (Wapet) LNG project which will comprise Gorgon gas fields feeding a two-train liquefaction LNG plant. The plant is due onstream in 2002.

Statoil is understood to have sold its 10% interest in the Bongkot field, offshore Thailand, to licence partners Petroleum Authority of Thailand, Total and British Gas for an undisclosed sum. The Norwegian company is expected to sell off its other Thai interests including its 20% stake in deepwater exploration blocks in the Andaman Sea, west of Thailand.

Petrobras of Brazil is reported to have signed an exploration and production contract for a concession on the north-coast of Cuba.

18th UK offshore licensing round

The UK Government has awarded 78 out of 82 North Sea blocks applied for under the 18th offshore licensing round. The awards were made to a total of 44 companies, of which 22 are operators of one or more of the blocks. Launched in June 1998, the 18th round was the first to allow companies to bid for almost any unlicensed blocks in the four mature areas of the UKCS: the northern, southern and central North Sea and Eastern Irish Sea.

Commenting on the awards, UK Energy and Industry Minister, John Battle said: 'Our expectation was that most applications would focus on acreage close to existing developments or infrastructure, where any discoveries were likely to be brought onstream as rapidly as possible in order to prolong the life of current assets. In the event, a majority of the applications received reflected this pattern, and there was

strong competition for several blocks. But, an unexpected – and very pleasing – number of other applications were received which identified strata and structures with previously unrecognised hydrocarbon potential.

'Some of these concepts were developed in blocks which have been licensed and explored for conventional targets before. Twelve of the blocks awarded have not previously been licensed. Eight of these are granted to the Shell/Esso partnership whose application stood out for its creative approach.

'Two of the blocks applied for – 48/19d and 210/20c – have been divided between competing applicants. This will allow presumed extensions of adjacent fields – Anglia and Otter, respectively – into the new acreage to be appraised and brought into production as soon as possible, while at the same time maximising exploration of the remaining area.'

Price of Brent crude at its lowest since 1960s

UK oil revenues have fallen to their lowest level in real terms since the 1960s, according to the latest Royal Bank of Scotland Oil and Gas Index. The price of Brent crude slipped below the \$10 mark at the beginning of December 1998, representing a fall of 47% since December

1997 and a fall of 30% since October.

Combined daily oil and gas revenues are reported to have risen by 6.2% on the month with the boost coming from higher gas production. On an annual basis, however, the revenues show a 30% reduction.

Year Month	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price (\$/b)
Oct 1997	2,619,632	8,193	19.89
Nov 1997	2,568,987	10,015	19.07
Dec 1997	2,709,258	10,880	17.38
Jan 1998	2,598,757	11,012	15.20
Feb 1998	2,582,700	10,305	14.07
Mar 1998	2,595,594	9,803	13.17
Apr 1998	2,571,241	8,844	13.53
May 1998	2,433,059	6,381	14.40
Jun 1998	2,406,521	6,069	12.12
Jul 1998	2,432,040	5,733	12.06
Aug 1998	2,379,644	5,640	12.05
Sep 1998	2,573,882	6,394	13.28
Oct 1997	2,600,813	8,140	12.60

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

In Brief

Papua New Guinea is understood to have awarded prospecting licence PPL 207, covering an area offshore southern PNG, to Arco International. It also awarded PPL199 to a consortium comprising Oil Search Ltd, Woodside and SPI (a company connected with the Napa Napa refinery project).

Gulf Indonesia Resources has announced that the Ujung Pangkah exploration well offshore East Java, Indonesia, has flowed at 20mn cfd of gas and 987 b/d of oil. The well is the first to be drilled in the Pangkah block.

State-owned Petronas and Esso Production Malaysia are reported to have announced plans to develop 22 gas fields offshore Peninsular Malaysia within the next three decades. The fields are estimated to hold 12.6tn cf of gas reserves. Development plans include the drilling of 162 new wells and the workover of 88 existing wells, together with the construction of new platforms and a new offshore gas pipeline.

Indonesian state oil company Pertamina is understood to have signed seven production sharing contracts with Arco, Unocal, Conoco and Ramu International Liability of the US and Japanese company Inpx.

Santa Fe Energy Resources is reported to have made a new natural gas discovery on the Jabung block on the island of Sumatra. The Gemah discovery well flowed 22mn cfd of gas and 1,414 b/d of condensate.

Africa

Texaco is reported to have acquired a 50% working interest and operating rights in block 1 offshore Angola from Shell for an undisclosed sum.

Repsol has announced that the Nakhaw-1X discovery well in the Khadda Offset Concession in Egypt has tested at 19.1mn cfd of natural gas and 732 b/d of condensate.

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Changes proposed to UK oil and gas EIAs

The UK Government has published draft proposals for regulations to assess the environmental impact of onshore gas pipelines and offshore oil and gas projects.

Local government bodies, oil and gas distribution companies, government agencies and environmental groups are to be asked to submit views on two new Environmental Impact Assessment (EIA) regulations.

The first consultation is for the Public Gas Transporter Pipeline Works (Assessment of Environmental Effects) Regulations 1999. The second is for the Offshore Petroleum and Pipeline (Assessment of Environmental Effects) (Amendment) Regulations 1999.

The regulatory proposals incorporate the following elements:

- For the first time ever there will be statutory requirement for proposed land-based gas pipeline projects of public gas transporters to undergo EIA.
- The second set of regulations amends the effect of EIAs on offshore petroleum production and pipeline projects.
- The scope for an environmental statement can be defined by the DTI after consultation with the environmental authorities.
- Thresholds will be set to exclude smaller projects, such as urban domestic gas supply schemes, from the requirements.

All comments are to reach the DTI Oil and Gas Directorate by 11 January 1999.

Backing the euro

Over 100 British companies, including representatives of the major oil and gas companies, recently urged the UK Government to join the euro 'as soon as the conditions for successful entry are in place'.

The business leaders signed a statement, published in the *Financial Times*, which set out a 'balanced business judgement' in favour of British membership of EMU (European Monetary Union). 'In the real world, there are clear economic advantages to British membership, and clear disadvantages to long-term self-exclusion', the statement said. It went on to say that staying out of the euro indefinitely 'would pose a serious threat to our future prosperity and to our influence in the world'.

Shell/Texaco deal is off

Shell Europe Oil Products (SEOP) and Texaco have called off the proposed merger of their European oil products marketing and manufacturing activities (see *Petroleum Review*, October 1998). According to SEOP President Paul Skinner, although a joint review by both companies confirmed the synergy benefits originally envisaged, it was concluded that the proposed venture would 'not maximise shareholder value for both companies'.

Skinner went on to say that Shell would continue implementing its own increasingly ambitious restructuring programme in Europe and would seek further opportunities to grow its market share.

Both companies stressed that termination of the European merger does not affect their joint alliance with Saudi Aramco in the US.

Yukos unveils Phase 2 restructuring

Yukos has announced the second phase of its major restructuring programme which began in July 1998. Prompted by the continuing slump in oil prices, the company restructuring is aimed at maximising operational efficiencies and reducing operating costs.

During Phase 1, the Russian oil company reorganised its management structure into three main entities based on its upstream, downstream and corporate business units. In order to focus on its core business, Yukos also transformed its service operations into 82 limited partnerships.

In Phase 2, operational efficiencies are to be enhanced by outsourcing oilfield services to the newly created partnerships and divesting non-core assets. In

addition, the company's production units will be allowed to sell crude oil to non-Yukos-owned refineries. Yukos-owned refineries will be able to purchase non-Yukos crude oil, while the company's marketing units will be able to sell non-Yukos oil and oil products.

'These changes introduce greater managerial accountability and competition across the spectrum of the company's local business units,' states Yukos.

Yukos has reduced its average cost of production per barrel of crude oil by 20% in the first four months of the reorganisation, according to Chairman and CEO Mikhail Khodorkovsky. Company management expects to reduce the average production cost per barrel by an additional 25% with the implementation of Phase 2.

United Kingdom

The insurance company Guardian Royal Exchange (GRE) is reported to have pulled out of the UK energy sector. The company stated that it had decided to cease writing energy business due to the intensely competitive market and will now focus on its core marine businesses of hull, cargo and excess of loss.

UK manufacturers of pilot and spring operated pressure relief valves Anderson Greenwood and Crosby have joined forces to create what they claim is the world's largest pressure relief valve company. The new company, Anderson Greenwood Crosby, is part of the Flow Control Division of the Tyco Group.

Ranger Oil reports that total revenues of \$234.2mn in the first nine months of 1998 were slightly lower than the \$240.1mn recorded in the same period a year earlier. A 69% increase in daily oil production to 53,430 barrels was offset by the substantial decline in oil prices.

BG plc reports that 3Q1998 group operating profit increased by £61mn to £99mn. However, a £6mn loss on the sale of assets, combined with a £30mn rise in interest charges left 3Q pre-tax profits at £11mn, £10mn down on the previous year. The group's Transco pipeline subsidiary posted a 3Q1998 operating profit of £62mn (an increase of £53mn) while operating profit for BG Storage fell by £11mn to a break-even position in the same period. The Group's E&P business recorded a 3Q1998 operating profit of £31mn.

Lasmo is understood to be planning to cut its London headquarters staff by 60% (approximately 200 people) as part of a company restructuring programme.

Europe

Spanish oil company Repsol is understood to have transferred its 66% interest in Astra of Argentina to its wholly owned subsidiary Repsol International Finance in the Netherlands in a bid to improve the group's consolidated tax position.

BP shareholders have overwhelmingly approved the company's proposed merger with Amoco with 99.8% of votes cast in favour of the deal. The merger will create the third largest oil company in the world, behind Exxon and Shell.

Petrofina and TOTAL catch 'merger mania'...

France's second largest oil company TOTAL has merged with Belgium group Petrofina. The merger, covered by a share swap rather than cash, creates the sixth largest oil company in the world and the third largest in Europe with a combined market capitalisation of around \$40bn.

The merger is expected to provide \$340mn of operating cost savings, primarily downstream, over three years. It is understood that both company brandings will be retained. This may hamper the potential for further cost savings, comment some analysts.

The two companies, assets look complementary, comments UK analyst Wood Mackenzie. TOTAL has a strong upstream business with a market capitalisation some three times that of Petrofina which is a predominantly downstream company with only modest upstream interests.

Petrofina also brings a strong base petrochemical business while TOTAL contributes its speciality chemicals activities. It is unlikely that the merger will raise any regulatory problems as the new company size remains below that usually considered excessive by the authorities.

In Europe, the merged operation will

have an estimated overall products market share of around 8% placing it fourth behind Shell (12.5%), BP/Mobil (11%) and Esso (10%), says Wood Mackenzie.

TOTAL Fina is a clear market leader in France and Belgium with a combined downstream market share approaching 25%. It will hold an estimated 15% of the Dutch petroleum products market, enabling it to vie with Esso for the number three position after Shell and BP/Mobil, while in the UK it is placed number four with an 11% market share.

On the refining side, the new company will be the third largest refiner in Europe behind Exxon and Shell. The combined grouping will also have a small presence in the US, Africa and Asia. The companies already have one shared refinery in the UK – the 9mn tonne facility in Humberside.

Upstream, TOTAL Fina will have combined booked reserves of 5.7bn boe with an estimated 1998 production of 1.1mn boe/d. This places the group in sixth position in terms of reserves, behind Shell, BP-Amoco, Exxon, Mobil and Chevron. TOTAL accounts for 85% of these reserves and 77% of production.

... close on the heels of Exxon and Mobil

Exxon and Mobil are to merge their operations in a \$75.4bn deal said to be the largest industrial merger to date.

The combined company – ranking number one in the oil and gas sector – will have a market capitalisation in excess of \$238bn. Exxon holds a 70% stake in the new Exxon Mobil venture which will be headed by Exxon Chairman Lee Raymond. Mobil Chairman Lucio Noto will act as Vice-Chairman.

Both company brandings and marketing divisions will be retained under the deal. Some analysts comment that this may reduce the potential for early

cost savings. The companies hope the merger will bring about cost savings of \$2.8bn after two years.

The deal is not without its complications and would most likely require massive divestments of assets in the US and Europe. Exxon's North Sea operations, for example, are operated by Shell while Mobil's European refining, marketing and lubricants businesses are allied with BP.

Some analysts predict up to 20,000 jobs could be lost as a result of the merger.

(See also p38 of this issue for more information on the merger.)

Gazprom more than doubles profit fall

Gazprom has posted a loss of \$891mn in the 1H1998, according to the United Financial Group's *Russia Morning Comment*, more than double that recorded a year earlier.

The worsening position was largely attributed to a much sharper fall in revenues than in costs.

The drop in revenue was across the board, with the largest decline taking place in gas sales to the FSU, down 45%

against 1H1997. Sales to Europe fell by 11% and domestic sales by 16%.

Despite the drop in profits, Gazprom spent \$3.2bn on capital expenditure in 1H1998, against \$3.4bn in 1H1997.

(UFG notes that barter transactions throughout the company, whether in revenues or costs, are treated on the same basis as cash which can introduce serious uncertainties into the financial results.)

The Institute Français du Pétrole (IFP) has acquired an 82.5% interest in Grenoble-based dynamic simulation and process control technology company RSI.

Norwegian drilling and oilfield services company Smedvig is reported to be planning to sell its UK platform drilling operations to Deutag of Germany for just over \$56mn.

North America

NACE International (The Corrosion Society) and SSPC (the Society for Protective Coatings) have formed a joint task force to explore closer collaboration and potential unification.

Russia & Central Asia

*Gazprom has said that it may have to cut output by between 3% and 4% to 20bn cmly due to the level of non-payments. The company's 1998 capital investment is reported to be \$2.1bn against the required \$4.5bn. Outstanding debts from Russian consumers stood at \$5.6bn at the end of November 1998. Despite the non-payments, the company is said to have stated its intent to make all of its foreign debt repayments due in 1999, estimated at \$1.5bn. It is understood that Gazprom may be facing losses of up to \$6bn this year.**

*Rosneft has released 11-month production figures for 1998. Production was 254,000 b/d against 270,000 b/d in 1997, a fall of 6%. Refining throughput was 75% of the levels recorded in 1997.**

*Lukoil plans to spend \$700mn of internally generated funds on capital expenditure in 1999, well below this year's initially budgeted figure of \$1.4bn.**

*Occidental Petroleum is to transfer its 75% in Parmaneft to the Komi Republic.**

Russian oil company Lukoil is reported to have acquired a 50.02% controlling interest in Russia's nuclear icebreaking fleet operator Murmansk Shipping Company.

** Source: United Financial Group's Russia Morning Comment.*

Cars claimed to be potentially at risk from LRG

Speaking at a recent conference run by the Retail Motor Industry Federation (RMI) which revealed the results of its investigations into the performance of lead replacement gasoline (LRG), RMI Health and Safety Advisor Peter Barlow claimed that by 1 January 2000, around 5.4mn cars may be potentially at risk from the new fuel lead replacement gasoline. The seminar presented the evidence relating to engine damage in Sweden where lead replacement gasoline has been on sale for over six years, and outlined the RMI's views on what the results mean for the introduction of a ban on leaded fuel in the UK on 1 January 2000.

Barlow stated that:

- Some engines which are able to use unleaded petrol because they have hard valve seats also risk damage by

using LRG. Therefore, by 1 January 2000, some 5.4mn cars may be potentially at risk from the new fuel.

- High engine temperatures with LRG may lead to high wear and hot corrosion.
- Engine damage is not limited to valve seat recession. Exhaust valve burn and turbo-charger hot corrosion have also occurred in Sweden.
- If the pattern of engine damage in Sweden was repeated in the UK, the RMI estimates that some 100,000 cars per year in the UK are in the high risk category.

The RMI also discussed measures which are necessary for motorists to minimise the potential for engine damage when using LRG or separate anti-wear additives which they add themselves.

Shell refinery rationalisation continues

Shell Europe Oil Products (SEOP) is to sign a non-binding Memorandum of Understanding with Statoil, proposing to exchange a 10% interest in Shell Nederland Raffinaderij's Pernis refinery for a 22% stake in the Norwegian company's Mongstad refinery in Norway.

Pernis, Shell's second largest refinery and ranked one of the ten largest in the world, processes 20mn t/y of high sulfur crude oil. Statoil's 10mn t/y capacity Mongstad facility produces LPG, naphtha, gasoline, kerosene/jet fuel, heating oil and diesel.

In addition, SEOP is also proposing the closure of Norske Shell's Sola refinery in Norway, which currently

employs 125 people, by the beginning of 2000. The investment required to bring the 2.6mn t/y capacity refinery in line with more stringent future product quality requirements, as outlined in the Auto-Oil Directive, cannot be justified, states the company.

Both proposals are part of SEOP's ongoing European refinery network rationalisation strategy aimed at addressing the company's over-capacity issue and shifting focus towards 'world-class assets and world-scale refining'. The company recently announced the closure of Shell Haven refinery and the rationalisation of capacity at the Berre L'Etang refinery in southern France.

October UK fuel prices

	Pence per litre
Diesel	
Lowest: Middlesb'ro	64.09
Highest: Inverness	69.33
National average	66.67
Unleaded petrol	
Lowest: Bradford	63.40
Highest: Inverness	68.20
National average	65.96
Four-star petrol	
Lowest: London	67.23
Highest: Aberystwyth	75.30
National average	71.39

Source: PHH Allstar Fuel Report

Potential for cost savings

The UK oil industry could save around £10mn per year as a result of changes made to the European Oil Stocks Directive, according to UK Energy Minister John Battle. The Oil Stocks Directive requires all member states to hold contingency oil stocks. Since the Directive's agreement in 1968, economies have been liberalised and trends in oil supply and demand, and industry structure have changed, explained Battle, necessitating a change in the legislation.

The revised Directive allows those countries which are exporters of oil to reduce their stocking obligation. The move will allow companies to reduce stock holdings by nine days on average. The new Directive is due to come into force on 1 January 2000.

United Kingdom

It is understood that Elf and the Somerfield supermarket chain plan to invest £25mn over the next 18 months on up to 50 new service station convenience stores in the UK.

Arco Integrated Power (40%) has joined Amoco Power Resources Europe (60%) to participate in a gas-fired power station in Great Yarmouth. The plant is due onstream in early 2001.

Europe

UK industrial gases company BOC is understood to be selling its Benelux and German operations to Air Liquide of France for £112mn. Proceeds from the sale will be used to cut company borrowings.

Kvaerner Oil & Gas has secured a £10mn, five-year contract for operations support, maintenance management and engineering integrity management for a gas compression plant at Bacton on the Norfolk coast, the 235-km Interconnector pipeline and a gas receiving terminal at Zeebrugge, Belgium.

UK electricity and domestic gas supplier Eastern Energy is understood to have formed an alliance with Dutch gas distributor Energie Noord West to sell natural gas in the Netherlands.

North America

Union Pacific Resources is understood to be selling its US domestic natural gas gathering, processing, pipeline and marketing operation to Duke Energy Field Services for \$1.35bn.

Middle East

Elf Aquitaine and Conoco are reported to have signed a \$400mn deal with the Syrian Petroleum Company to build a gas plant and associated facilities to handle gas from the Dayr Azzawr area located northeast of Damascus in Syria.

State-owned oil company Petrovietnam and Russia's state-run Zarubezhneft are reported to have signed an \$800mn deal to build Vietnam's first large oil refinery at Dung Quat in the central province of Quang Ngai. The facility will have a 130,000 b/d capacity.

UK lorry operators said to be losing out

UK Government policy on taxing the UK transport industry results in lorry operators paying twice as much tax as its European competitors, stated the Freight Transport Association (FTA) recently. A UK 38-tonne truck pays £22,000 per year in fuel duty and vehicle excise duty (VED) – over twice the highest rates anywhere else in Europe, commented Bob Cross, Northern Region Director of FTA.

He continued: 'UK tax policy places very serious competitive problems on the transport industry and on industry in general. A 38-tonner in the UK pays £3,120 in VED compared with £459 in France and £876 in Belgium. The same vehicle doing a typical 70,000 miles per

year pays £18,355 fuel duty in the UK against £10,355 in France and £7,830 in Belgium. It is not surprising that UK truckers are buying as much fuel as they can in continental Europe while many are investigating the possibilities of moving parts of their operations outside the UK.'

FTA estimates that in 1998 over £415mn will be lost to the Exchequer in respect of diesel bought in France but burned in the UK.

Cross also encouraged FTA members to support the Association's campaign against the government's fuel duty escalator which proposed to increase the duty on diesel by a further 10% in the next budget.

CHP to help meet UK's Kyoto commitments

The UK Government has made special provision for the assessment and approval of 'good-quality' combined heat and power (CHP) projects under stricter consents policy for gas generation as part of its review of energy sources. Commenting on the decision, UK Environment Minister Michael Meacher said that CHP makes a vital contribution to meeting the UK's climate change targets – it is estimated that CHP could account for at least half the 7mn tonnes of carbon savings the govern-

ment believes is achievable in industry.

Meacher said that the UK's CHP capacity has doubled in the last ten years to almost 4,000 MW and stated that this sector is now reducing energy costs by over £500,000 and cutting carbon dioxide emissions by around 5mn tonnes of carbon per year. He also reported that the UK Government plans to at least double CHP capacity in the coming decade. It is estimated that such an expansion will require further business investment of around £5bn.

Russian crude exports blocked

The Russian Ministry of Fuel & Energy has blocked crude oil exports by Sidanco, Tatneft, Rosneft, Onaco, Slavneft and Sibneft following the oil companies' failure to produce plans to supply the domestic market.

According to the United Financial

Group's *Russia Morning Comment*, this move marks 'a determination on the part of the ministry to retain crude oil within Russia rather than see it exported to more profitable destinations, although this can only damage the profitability of the companies themselves'.

Asia-Pacific

The state government of Victoria, Australia, is reported to be planning to fully privatise the state's gas industry. The three state-owned gas distribution companies and gas transmission grid have been valued at \$1.9bn.

The Symonds Group consultancy has been commissioned by the Government of Barbados to assess the technical and environmental implications of BOOT (build, own, operate and transfer) proposals for a new petroleum product storage and terminal facility in Barbados.

Africa

Shell and the 7-Eleven Corporation are reported to be planning to establish 7-Eleven convenience stores at the oil company's South African network of service stations.

Addendum:

● In the article on heating values of petroleum products, pp26-27 of the December 1998 issue, the key to Figure 2 should have read 'd' not 'd'. Elsewhere in the text, 'd2' and 'd4' should have read 'd' and 'd'.

● Please also note that Bill Miller is General Manager of IBM's Process & Petroleum Industry EAME, not Western's (p41, December 1998 issue).

UK Deliveries into Consumption (tonnes)

Products	†Oct 1997	*Oct 1998	†Jan–Oct 1997	*Jan–Oct 1998	% Change
Naphtha/LDF	237,045	230,365	1,731,553	2,342,260	35
ATF – Kerosene	753,930	850,459	7,086,916	7,637,196	8
Petrol	1,909,264	1,887,691	18,561,940	18,082,504	-3
of which unleaded	1,408,645	1,519,594	13,260,343	14,108,257	6
of which Super unleaded	43,120	34,087	436,480	344,355	-21
Premium unleaded	1,365,525	1,485,507	12,823,863	13,763,902	7
Burning Oil	269,069	264,766	2,604,329	2,807,220	8
Automotive Diesel	1,368,232	1,332,616	12,489,125	12,527,808	0
Gas/Diesel Oil	630,482	635,717	6,041,754	5,975,986	-1
Fuel Oil	282,315	188,201	3,279,463	2,272,452	-31
Lubricating Oil	80,922	68,067	738,911	687,126	-7
Other Products	738,182	681,161	7,241,508	6,797,938	-6
Total above	6,269,441	6,139,043	59,775,499	59,130,490	-1
Refinery Consumption	565,938	564,735	5,423,448	5,417,483	0
Total all products	6,835,379	6,703,778	65,198,947	64,547,973	-1

† Revised with adjustments *preliminary

The business of safety

The pressures on our industry have never been greater. We have a chronically low oil price, along with, at least until recently, a very uncertain UK fiscal regime, and our major contractors face increasing competition, often from countries with a much lower cost base. There is little reason to think that in the foreseeable future there will be any significant increase in the oil price, and therefore we must make our plans accordingly, said Lloyd's Register Chairman *Patrick O'Ferrall* at a recent Offshore Engineering Society luncheon lecture. The following article highlights some of the key points made during his presentation.

The last few years have seen a seemingly unending stream of safety and environmental legislation unleashed upon us. I have always believed in the fundamental importance to any industry of safety performance, and indeed environmental performance as key indicators of overall business performance. It has become a cliché, but it is no less true for that, that good safety performance is definitely good business.

We could be forgiven for seeing this new regulatory regime as just one more serious cost burden, perhaps even as one more reason for looking elsewhere than in the UK for our business. On the contrary, these changes are totally in keeping with other improvements in how the industry now manages its business.

Risk is an inescapable fact of life. It is our approach to the management of risk that will determine our success as an industry. Good legislation, properly implemented, can serve as an agent for cultural change and for the sharing of best practice.

Significant changes have been made to the way this industry now goes about its business as a result of Piper Alpha, and the subsequent recommendations of Lord Cullen. These changes have put the freedom to manage the risk squarely where it belongs – with the operator or duty holder. Real business advantages are already being achieved by risk-based decision making at every stage in the project life-cycle.

Taking the safety initiative

Good safety performance, or environmental performance, does not have to rely upon legislation. The cross-industry initiative involving UKOOA (UK Offshore Operators Association), IADC (International Association of Drilling Contractors) and OCA (Offshore Contractors Association), for 'A Step Change in Safety' is committed to a 50% improvement in safety performance over a three-year period. This is being achieved without legislation, and will require the continuing realignment of our culture, within management and throughout the workforce.

There is no doubt that the offshore industry has made enormous strides in recent years, and is now seen as a leader in safety management. However, there are a number of challenges ahead to ensure that we continue to improve and to enjoy the benefits right across the supply chain,



Lloyd's Register Chairman Patrick O'Ferrall

including our contractors, suppliers and service providers.

Piper Alpha

Although the earlier *Sea Gem* and *Alexander Keilland* accidents were tragedies that had provided many valuable lessons and led to many safety improvements, there is no doubt that the disaster which overtook the Piper Alpha platform on 6 July 1988, 120 miles offshore Aberdeen, was the worst in the history of the offshore industry. The accident and the subsequent Cullen Inquiry and Report have had the most profound effect on the management of offshore safety, not only in the UK, but world-wide.

There were many immediate lessons learned from Piper, both in the prevention of a similar accident occurring again and in the prevention of such rapid escalation and such large loss of life. However, previous experience had shown the limitations of addressing only the immediate circumstances of a major accident. No two accidents are ever the same, and we can only make real progress if we tackle the underlying causes.

In this respect, Lord Cullen's recommendations were far reaching. Not only did they provide for a new regulatory framework for the UK offshore industry, but they created the basis for a complete change in our safety culture – a change whose potential I believe we are only now beginning to understand properly.

Safety case

As recommended by Cullen, the UK Health and Safety Executive had

assumed responsibility from the Department of Energy for the regulation of offshore safety in 1991, and set about implementing the two other main recommendations of Cullen:

- the requirement for the operator to prepare a safety case for every installation; and
- the review of existing prescriptive legislation, including the Certificate of Fitness, and replacement with new goal-setting legislation.

The key issues to be addressed by the operator in a safety case are as follows:

- an appropriate safety management system, which is properly audited, must be in place;
- all hazards which could lead to a major accident must be identified; and
- all risks associated with these hazards must have been evaluated and measures put in place to reduce these risks to a level which is as low as is reasonably practicable (ALARP).

By November 1993, a safety case had been submitted to the HSE for every installation in the North Sea.

Subsequent legislation has now been introduced dealing with specific systems and hardware. Perhaps again in response to the particular circumstances of Piper Alpha, the PFEER (Prevention of Fire, Explosion and Emergency Response) regulations addressed the risks from fire and explosion, and the need to secure effective emergency response. The later Design and Construction Regulations (DCR) deal with all other aspects of an installation's integrity, as well as with the through life safety of the wells.

Risk analysis and assessment

The theme which extends throughout the safety case regulations, as well as PFEER and DCR, and indeed is reflected in most of the European legislation both onshore and offshore, is that a process of hazard identification and management should be applied. This will ensure that all foreseeable hazards have been identified and the associated risks are understood and controlled.

Our efforts to reduce risk must be directed to:

- preventing things from going wrong in the first place;
- reducing the frequency of occurrence;
- mitigating the consequences.

There are no fixed rules about how

risk assessment should be undertaken. The assessment will depend on the nature of the work undertaken and the type and extent of the hazards. Neither need all risk assessments take a long time to carry out. The driver who overtakes at speed whilst approaching a blind corner takes only a second or so to make such an assessment.

I have said already that there is no such thing as absolute safety. Risk is an inevitable fact of life. So what is an acceptable level of risk? How safe should we be, and who will make this judgement?

In trying to answer this very difficult question, the principle which has been carried forward from the Health and Safety at Work Act is that the risk must be reduced to a level which is 'As Low As Reasonably Practicable' – the so-called ALARP principle.

ALARP principle

Risk is measured between extremes. At one end of the spectrum risk is so high that it cannot be tolerated under any circumstances. At the other extreme the risk is so low that for the purposes of life or work we are prepared to take it pretty well as it is. In between these two extremes is the ALARP or 'tolerability' region. The ALARP principle requires for risks in this region a demonstration that measures have been implemented to reduce the risk until the cost of such risk reducing measures is grossly disproportionate to the benefit gained.

Health and safety at work

Risk-based hazard management is not a new concept, and in fact runs through most of the work done in Health and Safety over some 30 years. In 1974 the Health and Safety at Work Act had completely changed the nature of safety management in this country. As well as providing the framework for the implementation of many of Lord Cullen's recommendations, it has also provided the basis of much of the European legislation in this field.

The European Union has been involved in approving Directives on safety and health since the late 1970s and in 1989 a 'Framework' Directive on Safety and Health was approved, which included nine general principles for the prevention of accidents and ill-health at work. These general principles act as a template for all EU Directives on safety and health at work.

In the UK the Management of Health and Safety at Work Regulations introduced a general requirement on all employers for risk assessment, safety management systems, and for the appoint-

ment of competent safety advisors and emergency personnel and procedures.

The UK HSE has been instrumental in pushing these European Directives towards a goal or risk-based approach, and examples of this can be seen in many of the equipment based EC Directives where a requirement for risk assessment is placed on the manufacturer.

Business advantages

In managing any business successfully we must take our opportunities while managing the risks. Good legislation must be compatible with, and facilitate that process, while ensuring that Society's expectations for the protection of its people, its environment and its resources are met.

An example of this compatibility is in the PFEER regulations which require rigorous performance standards for each piece of equipment. This has resulted in Guidelines produced by the HSE and by UKOOA for Fire and Explosion Hazard Management, and for Emergency Response, which are excellent working documents, and can in fact be applied very effectively to the management of all major hazards.

With increasing penalties for production shortfalls, operators have seen the benefits of extending this risk based approach to production critical systems. This has resulted in a greater appreciation of the interactions between processes and systems, and is feeding through to more effective inspection regimes and planned maintenance systems. For Safety Critical Elements, the independent verification process is not a duplication of any of these activities, but rather a very useful and cost effective check that the assurance processes are working. Is this not something that a prudent operator might have done anyway?

Cultural change

In his report Lord Cullen pointed out that: 'It is essential to create a corporate atmosphere or culture in which safety is understood to be and accepted as the number one priority.'

By a 'culture' of safety, I mean the shared values, attitudes, perceptions, competencies, and patterns of behaviour that determine our commitment to the achievement of a safe working environment.

I believe that this will only be achieved when personal responsibility for safe practice is accepted by everyone involved. The ownership of safety does not belong only with management or with safety professionals, nor indeed can we blame only the workforce when things go wrong. We are all responsible for safety. ●

Tough times ahead for European construction yards



The face of the global E&P sector has changed in recent years, with attention increasingly focusing on the development of deepwater prospects and the bringing onstream of marginal and satellite fields. This has, in turn, impacted Europe's fabricators. Total demand for steel work has fallen, jobs are getting smaller and turnaround times are getting shorter. In addition, many yards are finding that they are having to offer total turnkey packages in order to secure major contracts.

Kim Jackson reports on the current state of the market and future prospects.

Arrival of the Jotun FPSO at Kvaerner's Stavanger yard in Norway

Floating production systems (FPSOs) and subsea installations continue to replace traditional platform designs in development plans for new oil and gas fields around the world. Not only are FPSOs often the only viable solution to exploit the increasing number of deepwater discoveries that have been made in recent years in the Gulf of Mexico, Africa and the Atlantic Margin, they also offer the advantage that they can be re-used on a number of projects, allowing development costs to be kept to a minimum. Meanwhile, the development of marginal and satellite fields in areas such as the southern North Sea, Irish Sea and Morecambe Bay, has led to a demand for subsea units and semisubmersibles. Where 'traditional' platforms are required, the trend has been towards the use of minimal facilities with lightweight designs. These factors

have combined to significantly reduce demand for steel work and most European yards are currently running at under 60% of their total capacity.

The tide does not look set to turn in the near future, with the continued low oil price and resulting economic crises impacting supply/demand. None of the yards contacted by *Petroleum Review* for this year's survey expect to be running at full capacity over the next few years.

In the UK, for example, the Offshore Contractors Association (OCA) reports that most yards are currently operating at about 40-50% of capacity, a figure expected to fall as low as 30% during the course of 1999. It should also be noted that the UK is hampered by the current strength of the pound which makes it very difficult for UK fabricators to export elsewhere. With the rest of Europe, excluding Norway, operating at about 60% capacity and falling, it seems likely that a major rationalisation of this sector may be in the offing.

Hiccup in Norwegian activity

Unlike most other European countries, Norwegian yards were relatively busy when we reviewed this sector in January 1998. Most were at, or near 100% capacity during 1997 and expected to be so for the next two to three years. Such a pattern was due to the Norwegian Government's strict control on E&P development rates, together with stringent monitoring of gas sales, which have produced a steady influx of business for the Norwegian yards.

However, business has begun to tail off – many yards are now only at 80% capacity or less – following the announcement at the end of 1997 that new Norwegian gas developments were to be put on hold until 1999. This followed recommendations from the Gas Supply Committee (GFU) that the next gas allocation round be postponed until September 1998 as currently producing and developing fields were capable of meeting existing requirements. The Ministry of Petroleum and Energy is not expected to decide on any new developments until the first half of this year and it is unlikely that any of these projects would start before 2002 at the earliest.

The continuing low oil price and reduced gas requirements have led to a number of Norwegian projects being delayed. Recent cancellations of gas purchase options have hit gas projects particularly hard as gas volumes required for delivery in 2000/2001 and beyond have been significantly reduced. This means that many of Norway's yards will be underemployed in 1999 and beyond.

Operator	Field*	Work	Delivery
UNITED KINGDOM:			
Amecc Process & Energy			
Wallsend			
Shell Expro	Shearwater	10,500-tonnes integrated deck	Early 2000
BARMAC			
(a) Ardersier			
Amerada Hess	South Arne	7,000-tonnes integrated deck	Apr-99
Norsk Hydro	Troll C	Two subsea riser support structures - 1,500 tonnes	Apr-99
Mobil North sea	Buckland	Five towheads/protection structures - 700 tonnes	May-99
British Gas	Easington Catchment Area (ECA)	Fabrication of 3,400-tonnes jackets and topsides	May-99
Statoil	Heidrun	625-tonnes of bundles and ancillary structures	Jul-99
Chevron UK	Alba	Phase II fabrication of five pre-assembled units - total 100 tonnes	Nov-99
PetroCanada	Terra Nova (Newfoundland)	Two compression modules - total 4,000 tonnes	Dec-99
(b) Nigg			
Amerada Hess	South Arne	110,000-tonnes concrete gravity base structure	Mar-99
Elf	Elgin/Franklin	36,000-tonnes TPG 500 platform, PUQ jack-up	Aug-99
Consafe Engineering			
(a) Aberdeen			
Transocean	Nordic	Accommodation module	Oct-98
Baker Hughes	Norway	A60 control cabin	Oct-98
Martin Decker Totco	Santa Fe, Galaxy 3	Drillers control module	Oct-98
Transocean	Kan Tan IV	Accommodation upgrade plus new module	Oct-98
Hitec	Navis Explorer 1	Mud module	Oct-98
Esso Norge	Jotun	60-man accommodation module for FPSO, including temporary refuge and helideck - total 850 tonnes. (Some work to be carried out at Burtisland site.)	Oct-98
BP Oil G'mouth	Firth of Forth Hound Point	Three-deck, 1,100-tonnes process topsides for marine vapour recovery project at tanker loading terminal. (Some work to be carried out at Burtisland site.)	Nov-98
Kvaerner Eureka	Osberg South	Three A60 pump enclosures	Nov-98
Sedco Forex	Sedco 709 (Cameron)	Stainless steel drilling control module	Nov-98
Procon	Statfjord A	Procut cuttings reinjection unit	Dec-98
Procon	Statfjord A	Zone II control cabin for Procut unit	Dec-98
Martin Decker Totco	Bingo 9000	Drilling control module	Dec-98
BP	Bruce II	Phase II modifications to living quarters	Feb-99
Switchgear & Instrumentation	Karachaganak (Kazakhstan)	Three Switchgear modules. Substation No 2	Feb-99
Martin Decker Totco	Sedco Express	Two drilling modules and four outrigger cabins	Feb-99
(b) Burtisland			
Chevron/Conoco	Britannia	Two spools and two subsea intervention vessels subcontracted from European Marine Contractors	Sep-98
BP Oil	Firth of Forth	Hound Point EPIC for 600-tonnes, 3-deck process topsides	Nov-98
BP	Bruce II	Living quarter modifications	Feb-99
Barmac	Elf Elgin/Franklin	Flare tower	Feb-99
Barmac	Elf Elgin/Franklin	Exhaust support structure	Feb-99
Smit Land & Marine	Elf Elgin/Franklin	Caisson riser, 175 tonnes	Feb-99
Oil States	-	BOP refurbishment	Feb-99
Wood Group Eng'g	Shell Brent, Bravo, Delta	Two ESP modules	Mar-99
(c) Montrose			
FMC	Kitina (W. Africa)	Two subsea manifolds	Sep-98
PGS	Banff pull ins	500 pull ins	Oct-98
Wood Group	Brent Delta	Switchgear module support frame	Nov-98
Barmac	Elf Elgin/Franklin	Platforms for flare stack	Nov-98
Smit Land & Marine	Elf Elgin/Franklin	Cooling caisson	Feb-99
Harland and Wolff			
Dolphin	Borgland Dolphin	Rig conversion	4Q1998
Global Marine	DP drillships	Bridging contract for design and construction of positioned deepwater monohull drillships	4Q1999/1Q2000
Heerema Hartlepool			
Shell	Shearwater	1,500 tonnes wellhead deck	Early 2000
Total	Dunbar	800-tonnes module	Mid-99
Kvaerner Oil and Gas			
(a) Teesside			
Amerada Hess	Triton**	5,622-tonnes FPSO topsides	May-99
Elf	Elgin A/Franklin	Two 2,000-tonnes wellhead topsides	2Q1999
Sable Offshore	Thebaud	Two decks, one bridge and flare boom	2Q1999
Sable Offshore	Venture	Deck and flare boom	2Q1999
(b) Methil			
Texaco	Captain B	Process and utilities platform for Captain expansion	3Q2000
Lewis Offshore			
Esso Norge	Jotun	2,500-tonnes turret, turntable, spider and gantry	4Q1998
Amerada Hess	West Guillemot and Abbot	Triton FPSO turret, turntable and spider	1Q1999
Elf	Elgin/Franklin	Turret mooring system	1Q1999
Odebrecht SLP			
(a) Lowestoft			
Shell	Ketch	1,100-tonnes topsides	Aug-98
Mobil	Malory	450-tonnes not normally manned platform	Oct-98

Current Workload at European Fabrication Yards (continued opposite)

Operator	Field*	Work	Delivery
(b) Teesside			
Shell Expro	Ketch	1,600-tonnes jacket and 700-tonnes piles	Aug-98
Shell Expro	Shearwater	2,500 tonnes wellhead jacket	1Q2000
UJE			
Esso Norge	Balder	Upgrading and completion of FPU	Apr-99
Bluewater	Ross	6,680-tonnes <i>Bleo Holm</i> FPSO topsides	Feb-99
THE NETHERLANDS:			
Grootint			
Statoil/Kellog	Kårstø	29 pre-assembled piperacks for gas processing facilities. Total - 10,200 tonnes.	Mar-99
Wintershall	D15-FA-1	2,850-tonnes topsides	Feb-99
Heerema Havenbedrijf			
Shell Expro	Shearwater	5,800-tonnes jacket	Mar-99
Norsk Hydro	Heimdal	5,200-tonnes jacket	Mar-2000
HSM			
Elf Petroland	K/4A	600-tonnes EPIC platform, 630-tonnes jacket, 540-tonnes piles	Sep-98
Mercon Steel Structures			
Petrobras	Marlim P-37 (Brazil)	2,500-tonnes turret mooring system, subcontracted from Bluewater	Dec-98
Statoil	Åsgard B	725-tonnes section of Åsgard B FPU, subcontracted from Kvaerner Rosenberg	Jan-99
SWEDEN:			
Emtunga			
Statoil	Åsgard B	1,800-tonnes living quarters and helideck, subcontracted from Kvaerner Rosenberg	May-99
Texaco	Captain B	32-men accommodation extension	Mar-99
SPAIN:			
Astilleros Espanoles			
Petrobras	Roncador	FSO conversion	Nov-98
	(Campos Basin, Brazil)		
Statoil	MST vessel	Conversion to drillship	Jun-99
Dragados Offshore			
Saga Petroleum	Snorre B	20,000-tonnes hull for semisub platform. Subcontracted by Aker Maritime/Kvaerner Oil & Gas alliance	Jul-99
NORWAY:			
Aker Stord			
Statoil	Åsgard A	3,143-tonnes topsides for FPSO	Nov-98
Statoil	Veslefrikk	Topsides and hull upgrading of floating production unit	Aug-99
Norsk Hydro	Øseberg South	13,700-tonnes topsides	Oct-99
Phillips	Eldfisk	6,000-tonnes topsides	Late 99
Saga	Snorre B	18,700-tonnes topsides for floating production unit	May 2001
Aker Verdal			
Esso Norge	Jotun	6,500-tonnes jacket and 3,500-tonnes piles	Aug-98
Norsk Hydro	Øseberg Gas	8,000 tonnes-deck, bridge and flare	Apr-99
Norsk Hydro	Øseberg Gas	6,000-tonnes jacket and 2,300-tonnes piles	Mar-99
Norsk Hydro	Øseberg S'th	7,000-tonnes jacket and 4,700-tonnes piles	1Q2000
Heerema Tønsberg			
Esso Norge	Jotun	8,300-tonnes wellhead protection platform topsides	Nov-98
Norsk Hydro	Heimdal	3,000-tonnes topsides for riser platform and 500-tonnes bridge	Apr-2000
Kvaerner Rosenberg			
Statoil	Siri	Jack-up production platform	4Q1998
Statoil	Åsgard B	20,000-tonnes semisubmersible platform	3Q2000
Leirvik Sveis			
Norsk Hydro	Øseberg South	Steel and aluminium sections	Mar-99
Saga Petroleum	Snorre B	1,500-tonnes living quarters and helideck	Apr-2000
NYMO			
Norsk Hydro	Øseberg South	1,500-tonnes drilling modules subcontracted from Bentec	3Q1999
Norsk Hydro	Troll Oil	2,000-tonnes subsea installations	2Q2000
Umoe Hagesund			
Norsk Hydro	Troll C	32,400-tonnes semisubmersible	2Q1999
FINLAND:			
Aker Mantyluoto			
Chevron	Genesis	Spar jacket	Summer 1999
	(Gulf of Mexico)		
Kvaerner Masa-Yard			
Esso Norge	Jotun	FPSO hull, to be assembled by Kvaerner Rosenberg	1Q1999
ITALY:			
Belleli Offshore			
Amoco	Marlin	8,000-tonnes hull for tension leg platform	Nov-98
	(Gulf of Mexico)		
Intermare Sarda			
Statoil	Åsgard B	800-tonnes stabilisation system (module)	1Q1999
Agip	Annalisa (Italy)	1,200-tonnes jacket and piles	1Q1999

Current Workload at European Fabrication Yards (continued opposite)

Drive to cut costs

The continued low oil price is also to a decline in demand for fabrication, with many oil and gas projects, such as BP's Clair project in the Atlantic Margin, being put on ice until financial prospects improve. Furthermore, operators are looking for increased savings from their contractors on those projects which are going ahead in order to keep overall development costs down.

This recently provoked the OCA to issue a warning to the industry that asking contractors to reduce margins even more to achieve further saving would 'be detrimental to the future of the industry'. OCA Chairman Syd Fudge said: 'I believe contractors are doing all they can to help the industry reduce costs, but with Crine's stated commitment to reducing lifting costs from \$12 to \$8 a barrel, there is a real danger that our margins will be squeezed even further as a quick fix.

'Some operators are seeking assistance from the contracting sector to determine ways of achieving this target. But the traditional approach of an early morning phone call summoning you to a meeting where you are asked to cut 20% of your costs if you wish to continue this contract still happens in the industry.

'There is no sharing of responsibility, no understanding of the real issues - just squeeze the contractor! If this practice continues it will be the beginning of the end of our industry.'

The UK Offshore Operators Association (UKOOA) firmly rejected OCA's warning. James May, UKOOA Director General, said in October 1998: 'You only have to look at what is happening in the industry on a global scale to understand the current pressures on the North Sea sector. These are tough times and the low oil price is leading to rationalisation right across the industry - not just here in the UK but elsewhere.

'No-one is immune. If the North Sea is to remain competitive we all - operators and contractors alike - have to look at our overheads and find efficiencies.

Heerema Tønsberg points out that this drive to cut costs has also resulted in some western European yards losing out to the 'low cost' yards of eastern Europe. Western yards are also having to compete with the more price competitive Far East fabrication sector.

One-stop-shop

Europe's fabricators are also increasingly having to offer operators 'one-stop-shop' turnkey projects, which offer cost savings, in order to secure major contracts. Such packages involve

Operator		Field* Work	Delivery
Snamprogetti	Sarroch refinery (Sardinia)	1,700-tonnes piping prefabrication for Sarlux-owned coal tar gasification plant	1Q1999
Agip	Annalisa (Italy)	600-tonnes desk	3Q1999
Rosetti Marino			
Elf	Kombi & Likalala (Congo)	Two 600-tonnes integrated decks	Dec-98
Agip	Limande (Gabon)	650-tonnes integrated deck	Jan-99
Inagip	Ivana (Adriatic Sea)	730-tonnes jacket and 200-tonnes piles (delivered July 1998), 350-tonnes living quarters, 750-tonnes deck	Mar-99
Statoil	Åsgard B	Three separation modules – total weight: 3,090 tonnes	Apr-99
BELGIUM:			
Bluewater			
Amerada Hess/Shell	Triton**	FPSO turret mooring system and swivel stack subcontracted from Kvaerner Oil & Gas for newbuild 105,000 dwt FPSO. Storage capacity – 624,000 barrels. Production capacity – 105,000 b/d	End 98
Talisman	North Sea	Design, procurement and fabrication of purpose-built hull for <i>Bleo Holm</i> FPSO	1Q1999
Esso Norge	Jotun	Subcontracted to supply turret mooring system for 92,000 dwt newbuild FPSO. Storage capacity – 585,000 barrels. Production capacity – 80,000 b/d	Mar-99
Petrobras/Astilleros Roncador(Brazil) de Cadiz		Subcontracted to supply FPSO turret mooring system as part of conversion of 1976-built 280,000 dwt tanker. Storage vessel (capacity – 2mn barrels) for semi-based P-36 (ex <i>Spirit of Columbus</i>) located in Roncador field	1999
JV Tenco/Saipem, Greater Nile Petroleum Operating Company	(Sudan)	CALM buoy for marine terminal facilities of Muglad oil basin development project at Port Sudan	1999
Shell	(Sri Lanka)	LPG conventional buoy mooring system for Shell Terminal Lanka in Colombo, Sri Lanka	1999

* North Sea fields unless otherwise indicated in brackets

** The North Sea Triton project comprises the development of the Bittern, Guillemot West and Guillemot Northwest fields by the Triton FPSO

Current Workload at European Fabrication Yards

design, engineering, installation and commissioning capabilities. This has led to the formation of joint ventures and alliances between different contractors – such as that formed between Aker and Kvaerner to bid for Saga Petroleum's Snorre II oil project.

Yards are also having to offer a range of construction capabilities, including floating production systems as well as the hybrid platform/floating production solutions required for the development of high pressure/high temperature or heavy oil fields, in order to stay competitive.

For some, this has meant an initial outlay in capital. UfE, for example, is understood to have spent nearly £1.5mn in extending its existing quay by 100 metres, deepening berthing facilities and installing a new mooring system in order to accommodate the *Bleo Holm* contract.

The contract, won in a joint venture with Fluor Daniel, involves the design of the vessel's 6,500-tonne topsides, as well as installation and hook-up of the accommodation module and helideck, and installation of the turret system. The fabricator had earlier signed a 10-year lease on the Inchgreen yard at Greenock in Scotland in late 1997, which provided it with a large dry dock facility and deepwater berthing, in a bid to position itself for the growing FPU market.



Ursa TLP hull, delivered to Shell by Belleli in June 1998



Jotun B wellhead platform topsides (8,500 tonnes) being installed by Heerema Marine Contractors' Thialf floating crane

Diversification and acquisitions

Some fabricators have diversified their portfolios to include civil work as well as fabrication for the oil and gas sector. For example, Dragados of Spain is currently fabricating the 49 approach sections of the Oresund Bridge linking Copenhagen in Denmark to Malmo in Sweden. The total weight of the sections is 185,000 tonnes. The contract was awarded by Sundlink Contractors and work is scheduled to complete by July this year. Other yards are looking to areas previously considered 'technology poor' such as boilermaking and drillships. There is also potential for fabricators to look to the decommissioning sector.

Some yards have also been looking to acquire additional, complimentary, yard capacity and skills outside of their home market. The Aker Group, for example, has not only expanded its business to Finland with the takeover of Finnyards, but has also acquired the state-owned MTW yard in Wismar on Germany's Baltic coast. Both acquisitions provide the Group with the capability to construct hulls for FPSs, with topsides being constructed at Aker Stord in Norway or Aker McNulty in the UK.

The Italian job

The Italian fabrication sector has struggled to remain competitive in the international arena due to the small size of its construction yards. As a spokesman from Belleli Offshore explains, most of these yards developed to service the needs of Eni and Agip's small gas fields located in

shallow waters. Such fields only required small facilities, such as jackets of 300 to 500 tonnes and topsides with a maximum weight of 1,200 tonnes. However, the dramatic reduction in number of projects in recent years has led these small yards to close – leaving just three major players: Rosetti, near Ravenna, and Intermare Sarda in Sardinia, which concentrate on the construction of small jackets and topsides for the Mediterranean Sea and West Africa; and Belleli Offshore, located near Taranto in southern Italy, which focuses on the construction of hulls for TLPs, floating production units and large offshore structures in general.

Prospects dimmed yet again for these three yards with the recent announcement that the Lira 1,000bn Alta Adriatico project has been postponed following problems with subsidence in the area near Venice.

It was recently reported that Halter Marine Group and electrical engineering company ABB are looking to acquire Belleli Offshore. If such a deal takes place, the yard, which is currently operating under capacity, could be boosted by a transfer of some of Halter's workload. Halter is understood to have a contract with Petrodrill to construct two Amethyst-class semisubmersibles with an option for a third.

Working in union

In a market demanding fast turnarounds, no yard can afford downtime due to contract disputes or strike action. In the UK, two offshore unions were recently reported to have marked the

start of a ground breaking alliance with the OCA by pledging themselves to a 'non-disruption' clause. The unions – the Amalgamated Electrical and Engineering Union and the General and Municipal Boilermakers Union – represent 75% to 80% of the 30,000-strong offshore labour force covered by the OCA. A working party is currently assessing a survival strategy centring on safety, training and future development needs, incorporating the non-disruption clause.

Future prospects

Prospects for Europe's fabrication sector look fairly bleak in the short-term. Demand is set to fall further with the continued low oil price and resultant economic crisis, and it seems inevitable that some degree of rationalisation will result. Only those yards which can adapt to the changing market and its demands will survive. ●



Load out of Jotun mooring current and anchor spider from Lewis Offshore's Stornoway facility



Sheikh Ahmed Zaki Yamani

Oil yesterday, today and tomorrow'

Addressing the first of a new series of annual autumn lunches organised by the Institute of Petroleum, *Sheikh Yamani* provided an incisive commentary on the current state of the industry and its likely future. The following is a shortened, edited version of his presentation



IP President Chris Moorhouse

Our industry is fast-moving and ever-changing. However, because of oil's global importance and the significance of the Gulf in the equation, the industry is unusually vulnerable to political events and economic pressures. This year has been different not because of the nature of the upheavals faced, but because of their concentration. Economic collapse in the Far East, currency meltdown in Russia, supply disruptions in Nigeria, political upheaval in Indonesia and military stand-offs in Iraq have come together in a supercharged mix to assail the oil industry. 'Never a dull moment' should be the industry's motto, but – I must confess the turmoil scares me.

Worst crash for years

Currently the oil industry is experiencing its worst crisis since 1986 and the oil price this year – in real terms – has reached levels not seen for 25 years. That oil prices crashed this year should not have come as a surprise. The Centre for Global Energy Studies (CGES) has been pessimistic about oil prices for some years. What was not expected was the speed of the 1998 price fall and the depths that oil prices actually reached. I have always thought that the return of Iraqi oil, if not dealt with properly by Opec, would be enormously disruptive. The longer it was kept out of the world market the bigger the problems arising from its return. Yet, when Iraqi oil

exports actually began to flow once again in December 1996, Opec had no contingency plan. The winter was extremely cold, prices were around \$23.50/b and Iraq's exports were a mere 320,000 b/d, so Opec – in its wisdom – did nothing. This is one of Opec's key defects: it lacks foresight, reacting to events instead of trying to prevent them from happening. Opec's resolve to pursue a policy of price stabilisation was slowly weakening from within. Some Opec members' commitment to the quota system was already wavering before the winter of 1996. Venezuela, for one, began to increase its output in 1995 and actively to seek new foreign partners to boost capacity and market share. Opec's lack of vision can best be seen in its decision, in Jakarta in November 1997, to increase quotas that had remained unchanged for four years, despite the fact that, two months earlier, Iraq's exports had reached 1.3mn b/d and Opec's production was also rising. Opec was caught out by a very mild winter and its failure to comprehend the significance for oil demand of the collapse of many Far Eastern economies, a collapse that was already well under way before Jakarta. Furthermore, they did not foresee that, despite Saddam's toying with the UN over renewing the oil-for-food programme in November '97 – a game he had also played in June and July of last year – he really had little choice but to let oil exports continue. We can expect

Iraq's oil exports to keep on rising. But rising Iraqi oil exports, in a weak demand environment, can only spell one thing – low, low prices – unless Opec plays its part. The Iraqi question, is – and has been for years now – a key component of the global oil scene.

One of Opec's vital functions is to 'manage the surplus', and the re-appearance of Iraqi oil has made this task that much more difficult. The price crash of 1998 was basically about far too many barrels chasing too few customers, but how did we get to that point? Opec should have become increasingly aware of the adverse consequences for oil prices of two key factors – the emergence of 800,000 b/d of additional Iraqi oil and the loss of around 1mn barrels of incremental oil demand from the Far East – but it did not! Having made a gross error of judgement in Jakarta, Opec compounded this mistake (a) by delaying its production cuts until April this year, and (b) by not cutting enough. This meant that it had to engineer further cuts in July – and even those were insufficient to push prices back up again, only to arrest their precipitous fall. I am reminded by this episode of the great urge Opec had in the late 1960s to wrest control of its own oil production from the companies.

The trouble is that, having achieved this control a decade later, Opec showed no particular aptitude for price stabilisation. Instead, it got carried



Guests enjoying pre-lunch drinks at the Waldorf Le Meridien



away with its own strident oil nationalism. The principal expression of this oil nationalism was the 'official government selling price' (OGSP). In the mid-1980s the system collapsed under the weight of excess oil supplies. I was personally against many of the oil price increases but political pressure from a vociferous minority of Opec meant that high oil prices prevailed for far too long. I not only battled against high oil prices, but tried to involve the companies in a new system to replace the defunct oil concessions – a system of interlocking economic interests. However, as a result of political pressures in the Middle East, oil concessions were ended and the industry became totally state-owned. A better arrangement, which could have brought healthier results to the host nations, involved the participation agreements that were negotiated and agreed with the companies but were abandoned, again under political pressure.

Oil pricing changes

I am proud to have been personally associated with the single greatest change in the oil market since Rockefeller introduced the concept of integration – the emergence of market-related pricing in 1985. The new arrangements made the pricing of oil more transparent and responsive to market forces than before. However, price stability has to be earned the hard way through the judicious use of surplus capacity. This is exactly what the companies were trying to do all those decades ago – and with some success, but at the expense of the owners of the oil. Opec's success on the price front has been spasmodic. Its members have not had the unity of purpose and the trust in one another to be able to manage the surplus effectively. In December 1985 the basket price was at \$27.5/b; in July 1986 it had crashed to \$8.8/b; in January 1987 it was back up to \$17.8/b. In view of such price instability, should one be that surprised at the emergence of oil futures markets? According to the CGES, the world's oil stocks increased by

six days' worth of forward cover between the start of the fourth quarter of 1997 and 1998. In October 1997 the Opec basket price stood at \$19/b; a year later it was at \$13/b. Six more days' worth of oil inventories seems to imply \$6/b less on the oil price. It is that simple. However, reported OECD stock changes over this period account for only 36% of the massive 479mn barrels stockbuild.

Missing barrels exist

This is the so-called phantom-barrel story. The Centre tells me that these missing barrels are likely to exist, but are difficult to capture in the IEA's reporting net. CGES has discovered that the world has around 600mn barrel of independent storage outside the company system. There seems to be enough storage outside the company system to take care of these 'missing' barrels, especially if we add some floating storage and slow-steaming into the equation. The massive oil inventory overhang is thus real enough and the desperately low oil prices we are witnessing bear testimony to its existence.

Oil prices can only strengthen when stocks return to more normal levels. How long will this take? A really sharp winter will hasten this process, but without such assistance I think it will take another three or so quarters, assuming full compliance from Opec. To get oil prices up to the \$17–18/b level some Opec ministers have been talking about would require further massive cuts from the Organisation. Moreover, this price rise would not happen overnight, but in six painful months. I would like to act as the Devil's advocate here and ask whether Opec should seek to boost prices back to \$18/b anyway? There is one lesson that should be indelibly etched on Opec's collective memory.

The price spikes of the 1970s encouraged the spectacular growth in non-Opec oil production that took from 44% of world output in 1973 to a peak of 71% in 1985. Non-Opec's share has declined since 1985, stabilising around

59.5% at present, and is certain to go even lower with oil prices so weak. Land-rig utilisation rates in the Lower-48 States have dipped below 50%. Why should Opec reverse this trend?

Another painful lesson for Opec is that price rises can offer a short-term boost to revenues, but they can also lead to death by a thousand cuts over the longer term. The Opec oil export earnings peaked in 1979 at \$673bn (in 1998 dollars). By 1986 their revenues had tumbled to \$114bn. This year – the year of the second price crash – Opec will be lucky to earn even \$105bn. In the period 1990–97 world economic growth (excluding the Former Soviet Union) averaged 3.3% per annum and oil consumption grew at a healthy 1.5% each year. But, when economic growth recovers from this year's setback, will oil demand growth be re-ignited? Over the last 10 or so years the Far East has been the brightest growth spot. Eleven of these Asian 'tigers' grew at a staggering 8% per year between 1990 and 1997. This year, these 11 will be lucky to grow at all. I believe economic growth will resume in these economies from next year onwards, but at a much slower rate. Credit will not be as free and easy as before, interest rates will tend to be higher and governments will be more cautious with their finances, now that capital inflows from abroad are greatly reduced. Slower economic growth in Asia is expected to reduce worldwide economic growth in the coming years to somewhere around 2% per year.

Tax rises on falling prices

Future oil demand growth will not be as robust as the last seven years. European economies seem to be turning increasingly against oil. Gasoline prices in the UK have gone up this year when crude oil prices have fallen by at least 33%. Taxes on oil products have been rising in most developed countries for many years, reaching, in some cases, absurdly high levels. One can safely predict that oil taxation will continue to rise, especially



Guests at the luncheon



Former IP President David Setchell and IP Vice-President Peter Ellis Jones

in countries where taxes are below average. Taxes on oil will have to rise substantially in the US too, if Congress eventually ratifies the Kyoto Protocol. Environmental concerns are now a political reality in much of the industri-

At the moment Opec has well over 5mn b/d of excess capacity, there are plans – scaled down of late – to boost this further. Venezuela plans the development of its massive heavy-oil resources, Iran is keen to take on for-

by Saudi Arabia and the other Opec member-states, I would have thought that a policy that encouraged inward foreign investments would be desirable. As for Iraq, it will have to be rehabilitated at some stage. If this were to happen in the next few years, its oil production capacity could rise to 6.5mn b/d by the year 2010, leaving Opec with 13mn b/d of extra capacity by that date. If global oil demand grows at recent trend rates, this extra capacity will be needed, but if Kyoto is implemented it will be too much. Is there any hope, then, of a sustained crude oil price recovery that does not involve Opec restraining its output? Unfortunately, it entails lower rates of growth in the world's oil production capacity and, by inference, in non-Opec's ability to produce oil. The beginnings of this trend can be seen already.

'...the Kyoto Protocol remains the greatest single threat to the wellbeing of the oil business.'

alised world and the greens are a growing political force, particularly in Europe. Oil taxation is likely to climb in the developing world too, because it is a cheap way of boosting fiscal revenues while at the same time curbing urban pollution and reducing congestion. Low economic growth and rising taxation pose a lethal danger to our industry. Although you would not have guessed it from the muted response of oil companies, the Kyoto Protocol remains the greatest single threat to the wellbeing of the oil business. Research done at the Centre suggests that implementation of the Kyoto Protocol would require a 4.5mn b/d reduction in oil consumption by 2010. The implicit worldwide 'tax wedge' to achieve this is around \$2.5/b in 2005, climbing to \$6/b by 2010. By this I mean that, while crude oil prices stay low (up to 2005) and then rise slowly, retail prices must increase at a faster pace to choke off oil demand.

The gas future

Gas has been making massive inroads into the power-generation market in Europe and there is huge scope for more of the same in Asia. Significant progress is being made in gas-to-liquids technology, which promises to provide a lower-cost solution to the problem of remote gas resources. It seems that another breakthrough in efficiency is close to hand with hybrid gasoline/electric automobiles and, some years from now, a fuel-celled engine

eign partners and Algeria has had an 'open door' policy to Western oil firms for some time now. Some even believe that it will not be long before foreign companies return to Saudi Arabia, although I must say that this is a view not shared by Saudi Aramco or the Saudi Ministry of Petroleum. Saudi Arabia does not see the need to invite companies into the Kingdom, given its current 2mn b/d of idle capacity at present and the wealth of technical expertise and equipment at its disposal.

However, the opening of Saudi Arabia's oil economy to foreign participation would divert investment to the Kingdom and thereby reduce the flow of upstream oil investments going to the higher-cost non-Opec areas. In view of the financial difficulties experienced

Predicting a bleak future

The real trouble, however, is yet to be seen, for there are lags in the system. Much-curtailed exploration expenditure in the non-Opec countries today means lower proven reserves some years ahead and lower production some years after that. Yet, even this scenario might not unfold if companies manage to reduce costs substantially under pressure from low prices. The oil industry has built up over the decades a vast, hugely expensive infrastructure to service a hitherto growing need for what is still an excellent fuel – perhaps the best. The grave fear is that in the years to come this infrastructure might prove in excess of future needs – in plain words, that the industry will have to contract.

The news that Exxon is merging with Mobil suggests that the threat of contraction is all too real. It means the industry believes the road ahead will be very bumpy. Moreover, the tragedy is that it will not contract because the world is running out of oil, but because the world is becoming less and less interested in what oil has to offer. Our industry has made many mistakes in the past, but I do honestly believe that the bleak future it now faces is not of its own making.



The IP launches its new training portfolio

As announced in *Petroleum Review* December 1998, the Institute of Petroleum is proud to launch its new portfolio of nine energy related training courses – including its longstanding and popular, 'Introductions to Oil Industry Operations' and 'Petroleum Economics'.

The IP is extending its range of learning events by acting as the "commissioning partner" for industry related training in the fields of economics, business and management, working with a number of different organisations and groups, each of which has recognised sectoral expertise and a proven track record as training suppliers.

The initial portfolio involves four experienced partners all of whom share the IP's commitment to 'quality' and value for money and the courses have been carefully chosen to reflect known practical market needs and requirements. In the future, it is planned to extend the range to other areas and sectors.

The IP sees the extended provision of

high quality courses as a natural development of its Lifetime Learning initiative launched two years ago and covering a wide range of activities, designed to help members deal with the needs of continuing personal and professional development. While this process demands exposure to a variety of different 'learning experiences', formal training remains a very important component.

For further information about the extended portfolio of IP Training please contact the Conference Department, The 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

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The IP's portfolio of Courses

Trading Oil on the International Markets

As part of a fictional trading team, delegates take decisions about the company's activities to maximise profits through an understanding of the economics of trading and the management of inherent price risks, trade the live crude oil and refined product markets worldwide and react to events as they happen using real-time information.

Price Risk Management in the Oil Industry

As part of a fictional trading team delegates identify and manage its exposure to price risk. They trade the full range of derivative markets including the live futures markets, and options are traded using a simulation programme. This course explains the workings of futures, forward swaps and options markets and how they can be used for hedging and price management purposes.

Operations Practice in Supply Trading

This residential course follows the trading activity associated with a barrel of crude from production through the refinery and into the petroleum product market. The operational practices employed in both the shipping and trading markets are presented, highlighting areas of operational risk confronted within trading operations and how these risks can be managed and litigation avoided.

Price Risk Management in Deregulated Power Industries

As part of a fictional power price risk management team, delegates learn to identify the price risk inherent in the company's gas and electricity businesses. The operation of futures, forwards, swaps and option markets are examined with delegates performing exercises on each type to ensure a full understanding of this fast-changing market. Delegates trade the live natural gas and electricity futures markets in Europe and the US reacting to events as they happen.

Introduction to Oil Industry Operations

This well established IP Course of particular value to companies without in-house induction events, provides a concise and informed introduction to operations, from the search for oil and gas to the delivery of products to different customers. Participants gain an appreciation of the principal activities in the international upstream and downstream petroleum industry and an understanding of how these inter-relate, as well as an awareness of the impact of external influences and ways in which the industry is adapting to increase its competitiveness and to meet new challenges.

Introduction to Petroleum Economics

This well established IP Course, of particular value to companies without in-house induction events, concentrates on the structure of the oil industry, the geopolitics of oil and the working of the principal markets. It provides an informed introduction to the economic and commercial background and general trends of the oil industry underpinning an understanding of oil and its markets, with an awareness of global and strategic issues.

Planning and Economics of Refinery Operations

This course covers the latest trends in product specifications, process unit yields and refining schemes, calculation of product value, refinery margins and process unit margins, simulating refinery operations and product blending and the optimisation of refinery operations, crude oil selection and product manufacturing.

Introductory Financial Accounting for Petroleum Companies

This course is designed for delegates who have relatively little experience in oil and gas accounting and finance. It will cover basic accounting and financial reporting methods for upstream activities and focuses on UK standards; however, US and international standards are also discussed.

United States SEC and FASB Accounting and Reporting for Petroleum Companies

This course provides a basic understanding of current United States SEC and FASB accounting and reporting requirements for oil and gas producing companies including the special problems in accounting for production sharing contracts and joint operations.

Bad times in the Gulf

In little more than a year, the governments of the region's eight oil producers – Saudi Arabia, Iran, Iraq, Kuwait, the UAE, Qatar, Oman and Bahrain – have seen the collapse of their basic financial structures. But most of them still have one or two cards to play. They could actually transform their long-term financial prospects if they were to recognise that relying on oil income is no substitute for a broad-based revenue system, writes *John Roberts*.

The collapse of oil prices since November 1997 has ensured that not one state in the Gulf – no matter how rich it might once have been – can now assume that it will be able to produce anything remotely approaching a balanced budget in 1999. Saudi Arabia, once the mightiest of the oil giants, faces a budget deficit in 1998 that has soared from an intended \$4bn and could well amount to more than \$15bn, more than a third of all expenditure. Nor has the Kingdom any substantial financial reserves on which it may easily call: these were run down a decade ago, in the wake of the last oil price collapse of 1985–6. Now, as Crown Prince Abdullah steadily takes control of the reins of government, the Kingdom has to plot a new future: one based on an oil income that is likely to yield a per capita GDP of perhaps \$6,000, whereas, barely two decades ago, it reached \$17,000. And those are figures that do not take account of almost 20 years of declining dollar values.

All is not lost in Saudi

Yet Saudi Arabia has the most cards left to play. It still has spare capacity; it remains the world's lowest cost producer – and if Exxon and Mobil can return to their Rockefeller roots, then why should the former US partners in Aramco not return to their old stamping grounds? The first two advantages go together. So long as it remained bound by its Opec quotas, Saudi Arabia ceded its one dominant advantage in the global marketplace: its ability to compete on price against the rest of the world's oil. Saudi Arabia's preparedness to stick by Opec or para-Opec agreements limiting its output to 8.023mn b/d ensured that the remainder of this year's requirement of 73.3mn b/d or around 59mn b/d was there to be shared between the owners of the other three quarters of the world's reserves. What's more, the Kingdom would still have to assign as much as \$1bn/year – the estimate of one Saudi oil official – to maintain around 2.5mn b/d of spare capacity.

As an alternative, the Kingdom could consider opening the floodgates, producing as much of its oil as the market can absorb, which means in the medium, if not the short-term, as much as it is capable of producing. Under such a scenario, prices would indeed fall yet further. But Saudi Arabia, one of the

world's major producers, would be able to recoup most, if not all, the lost income through increased export volumes. For Saudi, a 25% increase in production (8.0mn to 10.0mn b/d) would yield a 27.7% increase in exports (7.2mn to 9.2mn b/d), sufficient to offset a 22% fall in oil prices (\$10.5 to \$8.20).

Re-opening the Kingdom to external exploration and production – even on a very limited basis – would also send powerful signals to the global oil market. In financial terms, despite its dire straits, the Kingdom does not need to take such a drastic step. Saudi Aramco is, in strictly commercial terms, a well-run company and would have no problem borrowing any funds required to fuel expansion of its own output once it had reopened its mothballed capacity. After all, it only restricts its output because the government orders it to do so. However, this is only so long as it is borrowing on its own account: if the government uses it for indirect borrowing, which it did in 1997 when Aramco was used as security for a \$4.6bn loan to cover the budget deficit, the situation would be severely complicated.

But there are some potentially compelling practical reasons why the Kingdom might seek the return of at least some foreign companies. One is that it would send a powerful signal to global markets, demonstrate the Kingdom's willingness to break free of any Opec or para-Opec shackles. This, in turn, would hasten the closure of more marginal fields elsewhere in the world and, more importantly, cause companies drilling in less favoured regions to think twice or thrice about the wisdom of tying up capital long-term. Companies would be unable to ignore potentially sustained competition from a country with a quarter of the world's proven oil reserves and good potential for new reserves. Oil majors if offered prospects in the Kingdom – not necessarily in oil, but perhaps in gas – might feel less inclined to tie up scarce venture capital in less likely prospects outside the Kingdom.

Lastly, of course, there is the price-and-market share scenario which argues that the more aggressive Saudi Arabia becomes in seeking to secure market share, the faster and lower the price will fall. The corollary to this, however, is that the faster and farther it falls, the greater the prospect for a recovery that comes sooner, and is more sustained, than might otherwise be expected. This benefits the Kingdom, because any recovery in price would come after it had secured a significant

increase in market share, and thus boost the Saudi Treasury's long-depleted coffers.

For other Gulf states, there are also a few prospects that they may be able to secure at least some limited advantages from their current adversity.

Elsewhere in the Gulf

Iran faces hard choices, but also has some key advantages. Oil and gas constitutes a much smaller proportion of GDP, either directly or indirectly, than in its Arab counterparts across the Gulf. The last decade has seen a major – and moderately successful – campaign to boost non-oil exports. Low prices will also serve as a spur to develop the buy-back system in order to attract foreign investment capital into both onshore and offshore oil and gas projects. Iranian oil officials are already scrutinising the country's legal regime with a view to seeing whether foreign companies might be able to secure permits to develop the country's hydrocarbon reserves, even though the principle of granting concessions remains barred by the constitution.

Iraq is in the most peculiar position. Low oil prices, and its de facto separation from Opec, offer it a unique opportunity to expand both oil production capacity and actual output from recent levels of around 2.1–2.4mn b/d. If export prices slip only a little lower, to around \$9.20, then Iraq would, in theory, be able to export up to its pre-Gulf War Opec quota constrained level of 3.14mn b/d while remaining within the UN's \$5.27bn limit on six-month earnings from oil sales permitted under the oil-for-food regime. Action to take production up to the 3.6mn b/d level necessary to sustain such exports depends very much on the relationships between Saddam Hussein, the UN arms inspection regime, the US government, and those members of the Security Council reluctant to use force against Iraq, notably France and Russia.

It seems unlikely that the latest Iraqi pleas for a lifting of UN sanctions will succeed, but the Security Council may be prepared to adopt a more flexible policy with regard to allowing oil earnings to be used to improve its oil industry, and thus its revenue earnings. In the longer-term, the tensions between Saddam and his main western critics, the US and UK, are such that further air strikes seem probable. It is probable that these would trigger major internal unrest, and possibly cause wholesale defection of army units, making it unlikely that Saddam will survive 1999. In which case, UN sanctions on Iraq would then be mas-

sively eased within weeks of Saddam's fall, and lifted altogether some 12–18 months later, once the arms inspectors are assured that the successor regime is not developing or acquiring weapons of mass destruction. For the oil market this means that Iraq remains – under Saddam or under a post Saddam administration – a nation which has no reason to restrain output. It is likely to continue to expand capacity to produce to the maximum financial limit permitted by the UN Security Council.

For Kuwait and the other Gulf states, the problems are severe, but not desperate. Kuwaiti hopes for a balanced budget by 2000 are shattered, but the Emirate still possesses substantial cash reserves of some \$40bn, which would enable it to phase in a more structured government revenue system over the next several years. Kuwait has less spare capacity than the Kingdom, but Kuwait and the UAE can play to their underlying strengths as lowest-cost producers and base a long-term policy on maximising market share. In Kuwait there is a prospect of bringing back the oil majors whilst the UAE, at least for offshore development, has always let them maintain a significant presence. Neither country should therefore suffer from capital constraints in seeking to expand output in a cut-throat environment.

Industry reform issues

In Kuwait, the issues of reform in the oil industry and of government finances have been at the top of the National Assembly's agenda ever since its reconstitution in 1992. The question is whether the government, dominated by members of the royal family, can secure a trade-off with the national assembly on these key issues. The government wants energy sector reform to include the return of foreign company equity participation in exploration and development ventures, particularly in the northern fields near the Iraqi border, but this is opposed by the parliament. Both government and parliament remain sceptical about tax reform, not least because parliament's existing demands for greater executive accountability would become much louder were there to be serious debate on the introduction of a direct taxation system.

In the UAE, Abu Dhabi continues to retain sufficient funds to underwrite the basic development requirements of the lesser emirates, indeed it has just made a \$5bn loan to Saudi to help cover the Kingdom's budget deficit, whilst Dubai's reliance on oil has been declining for some years. The UAE may prove to be the only Gulf society on the Arab side of the Gulf that can survive

the current cash crisis without too much difficulty. Qatar remains subject to considerable constraints because of its government's determination to maintain large majority shareholdings in various multi-billion dollar gas schemes, and can now no longer rely on oil revenues to provide its share of capital costs. Bahrain remains tied to Saudi Arabia, but facing the harsh reality that the Kingdom's once-generous gift of the entire Abu-Safa oilfield revenues to the Emirate is now worth much less than when this assistance was first implemented in 1992–93.

As for Oman, it will simply have to trade on its record as a country which for almost two decades, in defiance of the prevailing mood in the region towards nationalisation, has worked closely with the international oil companies to develop its own oil and gas sector from scratch. Omanis, like their counterparts elsewhere in the Gulf, will have to learn how to live with constrained oil income.

If the argument that cash constraints might turn out to be a blessing in disguise appears somewhat disconnected with reality – after all most Gulf governments, with Iran as a notable exception, have really only paid lip service to the idea of both economic and revenue diversification – it should be noted that for the last several years at least one prominent Gulf official has sought to convince his colleagues of the error of their ways.

In 1994, Abdlatif al-Hamad, Director General and Chairman of the Arab Fund for Economic and Social Development (AFESD), which was one of the prime mechanisms for the redistribution of billions of petrodollars producers of the Gulf to their poorer Arab neighbours, took issue with mainstream government ministers throughout the Gulf who routinely argued that the Gulf states were simply suffering from temporary revenue shortfalls caused by low oil prices. 'It is illogical to say that shortages of revenue have caused the deficit when uncontrolled expenditures persisted over three decades as the general practice of governments,' he said. The problem was 'the absence of stable and well-defined fiscal and monetary policies.' Instead of introducing long-term structural reforms such as privatisation, the Gulf states preferred 'easy financing,' drawing down accumulated reserves or borrowing on domestic and international markets.

In particular, al-Hamad attacked two of the great shibboleths of Middle Eastern spending – the massive sums allocated to military spending and to

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Lead replacement gasoline – latest update

The legal requirement to cease selling leaded gasoline from UK forecourts from 1 January 2000 means that an agreement on how to supply a lead replacement gasoline (LRG) has become urgent. *Chris Skrebowski, reports on the latest developments*

Car clubs, motoring organisations and the owners of older vehicles are now expressing considerable concern about what will happen in 2000. This enquiry has become one of the most frequently made to the Institute of Petroleum's information service.

The principal requirement for LRG arises because a significant number of vehicles, possibly as many as three million that will still be operational in 2000, have engines built with 'soft' valve seats. These engines, if fuelled with unleaded gasoline, are potentially subject to valve seat recession (VSR). This occurs when the exhaust valves, lacking the protection of a coating of lead salts, hammer and abrade the soft cast iron valve seats, causing the valve clearances to disappear and the valves to recess into the seat. The result is incomplete compression, and possibly increased emissions.

Two years ago the British Standards Institute (BSI) started work on the development of a standard for LRG. This work effectively came to a halt as a result of the threat of confidential submissions being subpoenaed by lawyers involved in the case between the Petroleum Retailers Association (PRA) and Frost Petroleum over the suitability of lead replacement additive being used by the Frost Group. After a prolonged delay the case was settled out of court. However, a great deal of information about the Scandinavian experience with LRG came into the public domain as a result.

The major concern is that high temperature corrosion can occur when certain LRG additives are used. More importantly there is also evidence that mixing LRG additives of different chemistries can produce eutectic mixtures in which damaging effects can occur within normal engine and

exhaust operating temperature ranges. This is despite the fact that the additives used by themselves may only produce potentially damaging effects outside the temperature ranges found in engines and exhausts.

A recent seminar in London held under the aegis of the PRA made available much of its evidence that would have been presented in its court case, had it proceeded. Considerable time was spent demonstrating the impact of sodium additives and later of the combined effect of sodium and potassium additives on the turbo charger blades used in mid-1980s models of Saabs and Volvos. The academic corrosion experts at the seminar also suggested that the use of these additives could have produced exaggerated valve stem wear and valve seat failures. The seminar concluded with the PRA arguing strongly that if lead additives could not be retained in gasoline after 2000 their preference would be for the use of phosphorous-based additives. The PRA maintains that these offer the best alternative protection for valve seat recession although even this protection is less than that afforded by current lead additions.

The current position in terms of additives to replace lead is that there are four potential chemistries.

- Sodium salts – these, however, are widely felt to be unacceptable; partly because of the Scandinavian experience and partly because the point at which high temperature corrosion could occur is only slightly above the normal range of engine and exhaust operating temperatures.
- Potassium salts (there are a number of formulations including that described in *Petroleum Review*, September 1998). As the corrosion point temperature is significantly above engine/exhaust operating temperatures potassium has found wide application in LRG formulations in Scandinavia, Germany, Austria, Switzerland and the Netherlands as well as in some Far East countries. The basic chemistry of potassium salts are broadly similar to those of sodium salts and this has led some people to suggest that they might not be as suitable as was once thought.
- Phosphorous compounds have been used in New Zealand and their use is being promoted by a subsidiary of Associated Octel (see *Petroleum Review*, November 1998). According to the PRA, phosphorous compounds offer the greatest protection, after

lead, in terms of their effect on VSR and valve stem wear. In New Zealand all oil companies agreed to the use of the same phosphorous additive. The additive is dispensed into the vehicle fuel tanks from disposable plastic applicators or metered bottles. This system rather than pre-blending was used, at least in part, because most New Zealand forecourts are serviced so the additive is put into the vehicle tank by the forecourt attendant.

- Manganese compounds are being promoted by the Ethyl Corporation (see p40) on the basis of US and Canadian experience with the compound as an LRG additive. They also claim that the addition of the manganese compound they are promoting has octane-enhancing properties.

In the draft standard for LRG, which was circulated before the legal action but then withdrawn, the use of sodium, potassium and phosphorous based additives were specified with minimum and maximum addition limits. Manganese based additives were not covered.

One concern in selecting an appropriate LRG additive has been the degree to which the compound is harmful to the three-way catalysts fitted to modern vehicles. Whereas sodium and potassium salts have only limited impact on catalysts, both phosphorous and manganese salts are claimed to be harmful to catalysts – although neither is as harmful as lead.

Misfuelling potential

To date, the potential to misfuel vehicles has been effectively avoided by dispensing leaded gasoline through wide nozzles whereas unleaded is dispensed through narrow nozzles. Leaded has also been colour coded with a red hose while unleaded is green. The initial intention would be to dispense an LRG through the red hose/wide nozzle equipment. Later when the fleet requiring LRG has become low the requirement is likely to be met by the use of unleaded which is then supplemented with an injection of additive directly into the vehicle tank.

For the oil companies, decisions on the route to take have now become urgent. Tankage and forecourts have to be lead-free by 1 January 2000. To ensure compliance, leaded gasoline will have to start being phased out by mid-1999 to ensure that residual leaded product, in tankage and lines, has been flushed out prior to January 2000.

Service stations will introduce alternatives to leaded petrol

UK service stations will introduce new products to replace leaded petrol before the ban on lead comes into force on 1 January 2000 according to the UK Petroleum Industry Association (UKPIA), which represents the major oil companies. Alternatives will be available on UK forecourts well before the EC deadline. The precise format of the new lead-replacement petrol and anti-wear additives will be a commercial decision for each company.

The oil industry is supporting a national information campaign highlighting the options available to ensure that drivers who need to use leaded petrol can continue to use their cars after

1 January 2000. A DETR brochure explaining the changes is available at service stations throughout the country.

'Moving from leaded petrol to lead-free alternatives has been very successful elsewhere', said UKPIA Director General Dr Mike Frend. 'Countries such as the USA, Germany, Sweden, Netherlands and New Zealand have already made the change successfully. We will provide UK motorists with all the information they need to make the transition as smooth as possible.'

Further information is available on the UKPIA website: www.ukpia.com or contact Mike Frend on +44 (0)171 240 0289.

Further complicating the issue has been the UK Government's reluctance to reveal the future levels of duty that will be applied to the various grades and formulations of gasoline. The leaded grade that is to be withdrawn is a 97 RON, 86 MON 0.15 g/l lead grade. Unleaded is available as either the 95 RON, 85 MON premium or the 98 RON, 87 MON super unleaded. To date the 98 RON super unleaded has borne a disproportionate tax burden, ostensibly because of concerns about the marginally elevated benzene level in this grade.

The draft standard for LRG specified 97 RON, 86 MON. As LRG additives, unlike lead, generally have no octane enhancing properties (manganese based compounds are claimed to be octane enhancing) this would be an expensive grade to produce. If the oil companies add an LRG additive to the 95 RON unleaded, customers will be up to two octane numbers short of the requirements their vehicles were designed for. However, it has been estimated, by Shell, that more than half the

vehicles using the current leaded grade can operate, without efficiency penalty, on a 95 RON LRG. The remaining vehicles would need to be adjusted to use the lower octane grade but there would probably be some performance penalty. This, however, may not be very great, as most of the vehicles involved will be over 10 years old. The alternative of using a higher octane base stock, possibly the 98 RON unleaded, is likely to be unattractive from the cost point of view unless the government radically alters the duty it levies. To date there has been no indication that the government is prepared to do this.

Streamlining additives

There is now a fairly general consensus that a single additive needs to be agreed upon by the industry. This is the only way that they can ensure that eutectic mixtures with unpredictable corrosion impacts are not formed. There are two major complications to a ready agreement. Many of the companies would like to follow their practice in much of

Europe and use potassium. However, the limited available evidence suggests that this is technically less satisfactory than using phosphorous (virtually no data are publicly available on manganese).

The UK government has apparently indicated that it would like to see a single agreed solution but is not necessarily prepared to direct companies. A further complication is the handling of excise duty. This will largely determine whether the industry offers LRG at 97 RON or above and does not get involved in telling owners how to get their cars adjusted or whether it sells a 95 RON LRG and explains the impact to owners of vehicles with a higher octane requirement.

Extent of changes

Finally, there is the question of the size of the car parc likely to be affected by the changes. A widely quoted figure is that there will be 5mn vehicles requiring LRG in 2000 – around 3mn of these will be able to use a 95 RON-based fuel without adjustment while the other 2mn would require timing adjustments. There is, however, a real possibility that these numbers may be substantially too high. Large-scale overcapacity for car production in Europe means that prices of both new and second-hand cars are weak and tending to weaken further. More competitive pricing, particularly for second-hand cars, could lead to accelerated scrappage of the older vehicles that would comprise the LRG market. In the case of New Zealand large numbers of second-hand cars were imported from Japan (which is a right-hand drive country) and many of the older vehicles were scrapped and replaced by these imports. As recent legislative changes in the UK make it easier to import second-hand cars, it seems possible that the New Zealand experience could be replicated with accelerated scrapping rapidly diminishing the vehicle parc requiring LRG. ●

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domestic subsidies – and he also warned that it was time to start thinking about taxation. What's more, he directly linked taxation to social – i.e. political – reform. The introduction of taxes, he said, 'requires that the constitutional statement, "no taxation without representation," be well preserved.' He then asked: 'The imposition of new taxes is technically feasible, but are the GCC countries ready to accept the political and social implications of such action?'

Long-term versus short-term

Four years later, addressing the World Oil Prices Conference in London in

September 1998, the AFESD Director General reiterated his concern that 'it has been the habit in these countries to treat changes in oil prices as short-term phenomena that will not last, nor occur again, with no long-term strategies aiming at real structural changes in fiscal policies and investment programmes.' He added: 'By contrast, consumer countries have usually dealt with events in oil markets as long-term trends in their strategic planning and structural adjustments. It has become obvious now more than ever that all countries of the Gulf region are in great need of radical changes and overall reforms.' The current budget crisis brought about by the fall in oil prices 'should

be used to accelerate the implementation of this reform.'

It is a radical agenda, particularly for the more conservative members of the six-nation Gulf Cooperation Council. But, unless Abdlatif al-Hamad is wrong and the Gulf 'habit' proves to be justified, with a permanent and sustained recovery in oil prices to their pre-1998 levels, all the Gulf states, from Islamist Iran to Baathist Iraq, Wahhabist Saudi Arabia and the pre-feudal Emirates and Sultanates of the Gulf will be forced to face the prospect of considerable social reform as the necessary political price they will have to pay to tackle not just a short-term fall in oil prices but the long-term consequences of too great a reliance on oil revenues. ●

Low crude price environment speeds downstream restructuring

The recent wave of mergers affecting the oil industry super-major league raises a question as to the future of Europe's smaller players. The solution is unlikely to be to follow the merger mania, writes *Mathieu Zajdela*, Managing Director, Downstream PetroFinance.

A classic complaint from integrated oil company shareholders is that the downstream sector captures a disproportionately large share of capital investments relative to its rate of return. Oil company management has for years been seeking a solution to this problem, given that the overall return on assets cannot be improved significantly if any major part of their activities remains mired in low numbers.

Many companies have taken measures to reduce costs radically: changing their organisations, tracking all the expenses that could be eliminated, and closing refineries, depots or regional headquarters. A few have ventured to take even more radical measures, such as divesting assets altogether or merging operations.

Other companies, notably in Europe, have lagged behind in taking radical cost-cutting measures or announcing strategic alliances. There are several reasons for the apparent hesitation. Relatively small companies have found it difficult to reduce their asset base without changing the nature of their activities. Among the larger firms, it appears that some were held back by a belief that the downstream segment was a necessary evil to secure their higher-margin upstream activities. Others admitted low returns from downstream but underlined that their downstream activity allowed them to reduce the fluctuation in their level of cash flow, which indirectly led to a better valuation of their publicly traded shares than if they operated as pure upstream companies. Finally, some companies were not convinced that the political and social

difficulties created by drastic cost-cutting measures or a large-scale merger would be worth the costs saved.

All change

In one way or another, each of these reasons is valid. But the past few years, and particularly the past few months, have brought two major changes which should persuade any company still hesitating to think differently. The first major change is the decline in crude oil prices – in contrast to the price fluctuations which the industry has experienced in the past, this time the low prices are likely to be here to stay. Indirectly, this has dramatic consequences for downstream operations: with upstream profitability set to stay under pressure over the long term, low returns on the downstream segment can no longer be tolerated as a necessary evil that must be maintained for the sake of its complementarity to upstream operations.

The second, and related, factor is that the major oil companies – those which set the standards in terms of profitability – are now all moving toward major cost-cutting plans. In Europe, the first companies to go down this road were BP and Mobil, although this has not yet impacted the industry as a whole. The merging of their European downstream operations has resulted in a significant improvement of profits, to an extent that neither could have achieved alone. The fact that this move has translated into higher profits for shareholders rather than lower prices for customers is linked to the fact that BP/Mobil's cost reduction – as a relatively isolated factor – has not set the industry standard. However, the pace of change is set to accelerate, particularly in view of Total and Fina's recent announcement, and even more following Exxon's takeover of Mobil.

Cutting costs

If the largest competitors become more cost-efficient, then the most cost-efficient among them is likely to become the industry standard rather than remain the exception. In a market where demand growth is levelling off and competition is intensifying, a part of these savings will necessarily be passed on to consumers. This raises a few important questions:

- What proportion of the savings is likely to be passed on to consumers?
- What does this mean for other global majors?
- What does it mean for other European competitors?

Regarding the level of cost savings passed on to the consumer, a first approach would be to examine historical trends. In the long run, if all companies go in the same direction, close to 100% of the savings should be passed on to the consumer (see **Figure 1**). However, the curve showing the proportion of cost savings against time varies a great deal, and it is the shape of that curve which is important to shareholders. In markets with no growth – and with surplus supply – the proportion can reach 100% relatively fast and, when over-balance leads to price wars, can even rise above 100%.

Looking at past trends in the European market, there is every chance that the process of change will be fast-paced. A likely scenario is that 50% of savings will be passed on to consumers after three years. But here again, all will depend on the supply/demand balance. This is where the new fuel specifications can bring radical change to the industry (see later).

Looking at the impact of cost cutting on other global majors, Shell's radical measures in this regard are unwelcome news for BP/Mobil and Exxon, who have to a large extent already implemented similar measures. Increasing profits by cutting costs can work once only (at least within a given 5 to 10 year period). Those who have already implemented such measures, and parts of whose organisation are already at the limit of what can be handled within the given resource and technology constraints, will be forced to find innovative answers. In a way, companies which have yet to take full advantage of cost-cutting and restructuring measures are fortunate, in that this opportunity for boosting profitability still lies ahead of them.

Reason for concern

In terms of European companies, most are suffering from low rates of return, and have reason to be concerned. The likely scenario where significant savings may be passed on to consumers will leave companies already suffering poor results the hardest hit, meaning that to increase their results, they would have

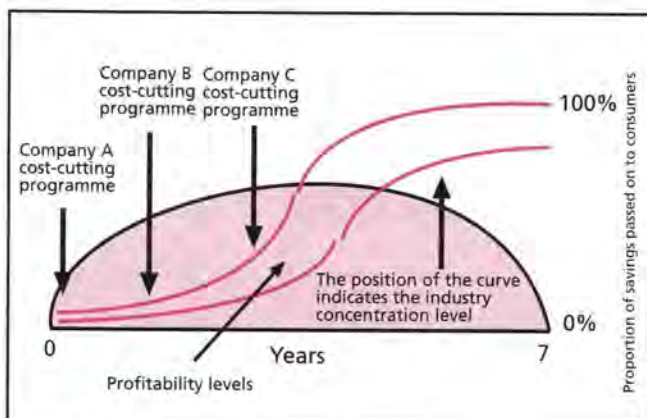


Figure 1: Cost savings and profitability levels

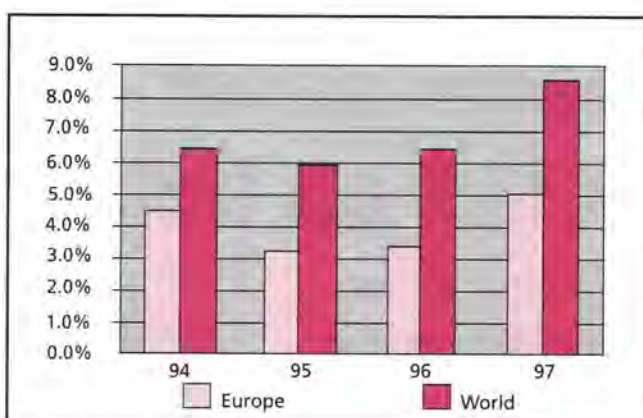


Figure 2: Downstream return on assets (ROA)

to go, in terms of cost-savings, well beyond what most of them have announced they would do. However, it is unlikely that the appropriate answer would be to follow the merger mania now afflicting the super-major league.

First, whatever merger they may undertake, these medium-sized players will never be able to reach a size comparable to that of the super-majors. Also, most of the mergers involving two European majors would present little industrial synergy, while predictably generating major cultural and organisational problems. Arguably, a merger within the European arena could involve not two, but several regional majors. However, a three-way merger to achieve the size of BP/Mobil in Europe would require partners equivalent in size to, say, Conoco, Repsol and ENI – and it is difficult indeed to envisage a union among such disparate organisations. Also, to implement such a merger, the management of these companies would need to be convinced of the absolute necessity to move in this direction. Strong political support from the domestic and European administration would also be required.

Simple solution

The answer is likely to lie elsewhere. A more simple solution for a European major to compete effectively with the super-majors would be to become a major supplier of energy in its domestic markets, or in a limited number of regions, rather than a supplier of oil product, as this would preclude the threat of disappearing altogether.

The deregulation of the electricity and gas sector is therefore a unique occasion for medium-sized European oil and gas companies to ensure their competitiveness through a radical change of strategy. There are already existing examples of such companies, being involved in various segment of the energy business, and the evidence suggests that they are in a better position

to resist the major restructuring that the oil sector is currently experiencing.

Impact of fuel specifications

The implementation of the new 2000/2005 fuel specifications poses another major challenge by substantially increasing the amount of capital required to operate a refinery. While this is a constraint for European refiners, it will also increase the barriers to entry for newcomers and create an element of protection from cheaper low-quality products.

Before new specifications came to reverse the trend, the amount of capital necessary to operate a refinery was declining rather than increasing over the recent past. This decline is not in absolute terms – the average refinery is not less sophisticated today than it was ten years ago – but it is true in financial and relative terms. There are four factors behind this decline. First, on the supply side, it has become cheaper to refine light crudes (rather than adding sophisticated conversion units) thanks to the rise in the European production of light crude. Second, on the demand side, the share of heavy product (fuel oil, bitumen, lube oils, etc) has remained relatively stable since 1990, thus reducing the relative value of light product. This is true at a European as well as a worldwide level. Third, refiners themselves have created a few cost-competitive players by selling their assets at low prices rather than closing them down. Although there were only a few such transactions, these were enough to increase the pressure on margins. Finally, there was no radical change in the legislative or fiscal environment over the 1985 to 1995 period. The introduction of unleaded gasoline in the late 1990s and the change in diesel specification to 500 ppm in October 1996 did not require investments of the scale seen in the early 1980s following the first conversion wave. Therefore, there has been no specific event to justify decisions to reduce capacity, as was the case in the early 1980s.

The new specifications due in 2005

mean that the trend is being reversed and that the amount of capital required to stay in refining is increasing. In light of this, one can assume that the number of players – or, more precisely, the number of refineries – has to decline. But everything will depend on refineries' behaviour during the coming months. Clearly, if this major investment wave is not coupled with a certain level of restructuring – in other words, if each of the existing refineries invests the necessary amount – the market is unlikely to find a balance at a higher level of profitability.

This new wave of investments may also be the last chance for the European industry, for a very long time, to move away from its low profitability levels. Supporting evidence of this is to be found in the US experience – there is a very clear correlation between the proportion of assets in areas with the most stringent specifications and the level of return on assets. Companies with a high proportion of refining assets on the west coast are also the most profitable. However, it can be argued that, because the changes due in 2005 have no precedent elsewhere in the world in terms of sheer scale, it is difficult to anticipate what will happen in Europe by that time. This is the reason why, in weighing their investment options with regard to the new fuel specifications, oil companies must take into account the impact of their decision on the global industry environment.

New face of the future

The combination of this wave of merger and cost-cutting plans on the one hand, and of the planned radical change in product specifications on the other, confirm the historical nature of the coming months. No one knows for certain how European oil companies will react. However, it can be said with some assurance that by the middle of the next decade, the downstream sector will look very different from the one we know today.

Deep water – sole bright spot in US oil industry gloom

The US oil industry is struggling to come to terms with the realisation that oil prices are unlikely to rise soon from their abysmally low levels, writes *Judith Gurney*. Companies have few options for 1999. They can try to reduce capital expenditures further through restructuring, redundancies, and cutbacks of development and production. Alternatively, they can form partnerships or joint ventures and enter into mergers, either willingly or under duress.

Some companies are finding it particularly difficult to cope because extensive cost reductions that they made in the early 1990s have left them with little fat for trimming. Others are in trouble because they overspent upstream budgets in recent years by paying large bonuses to secure deep-water blocks in the Gulf of Mexico. Integrated companies with refineries that benefit from low oil prices are generally in better shape than exploration and production companies.

More consolidation

A strategy to maximise returns on underperforming assets by embarking on joint ventures, mergers, and other types of alliances has been popular in the industry for several years; the collapse of oil prices has accelerated the trend in this direction.

The rationale behind most mergers is a perception of complementary interests – although this may be one-sided. A fit is often not obvious, so that a number of announcements of merger discussions, such as those between Exxon and Mobil, have surprised even seasoned merger analysts. A good combination of assets, as between BP and Amoco, and Ocean Energy and Seagull, is a strong indication for the success of merger talks. Financial weakness is another, where one company has a strong balance sheet and another insufficient capital to exploit its resource holdings – the Kerr-McGee/Oryx deal is good example of this. Another factor which can increase the chances for a merger is proprietary technology held by one company which another company needs for the commercial development of offshore fields.

The new year will also undoubtedly see less far-reaching and dramatic arrangements by companies involving the transfer of assets, such as the recent complicated exchange of properties held by Arco, Mobil and Vastar in California and the Gulf of Mexico. There will probably be more project-focused alliances, like that of Anadarko and Mobil for developing the super-giant Hugoton gas field, and pipeline company consolidations. Combinations of service companies, such as the recent mergers of Baker Hughes with Western Atlas, Halliburton with Dresser, and

Reading & Bates with Falcon, increase the scope of services such companies can offer.

Downstream consolidation is also likely. US Government regulations on emissions, and on the cleanup of shutdown refinery sites, have driven the refining industry to capacity rationalisation. Joint ventures, sometimes including marketing and transportation, are seen as a way of achieving operating cost reduction, avoiding capacity expansion, increasing market share and realising economies of sale.

Cutbacks

There will undoubtedly be more cutbacks in onshore and shallow offshore operations. One area that is already experiencing a lot less activity is the Austin chalk formation which extends some 650 miles from Texas to Louisiana, a financial marginal play that traditionally responds to cycles of boom or bust. As elsewhere, reduction in production and development directly affects the drilling industry particularly, in the case of Austin chalk, companies specialised in horizontal drilling.

Although drilling activity as a whole took a while to react to falling oil prices, by mid-August 1998 the rig utilisation rate onshore was at 54%, compared to 78% the previous August, and it has continued to fall. Dow Jones reported that oil drilling companies experienced a drop in stockholder value of more than 34.36% between 17 July and 24 November 1998, the highest percentage loss of all Dow Jones industry groups; oil equipment and services came second, with a loss of 27.58%. There is every indication that this situation will continue, with fewer and fewer working rigs except for those chartered under long-term contracts for drilling in deep and ultra-deep waters.

Sustained activities

The one bright area in this scene is the deepwater Gulf of Mexico. Last year's March and August MMS auctions attracted many high bids for deepwater blocks, although there were differences in the participation level of some companies. The most notable changes were the much reduced presence of Shell, long the star player of this theatre, and

the prominence of Unocal, Marathon and Mobil.

Many companies, especially majors, will go to great lengths to avoid cutting back on deepwater exploration designed to replace their current, declining reserve base, especially since they have already invested a lot in this sector. In the six MMS auctions held since 1996, companies have spent almost \$4bn in non-refundable bonuses to secure deepwater blocks, with more than two-thirds of these blocks in water depths greater than 800 metres. The slow pace of exploration in deep waters reflects not so much the price of oil but a critical shortage of rigs capable of working in great water depths – currently, there are only a handful of rigs with the capacity to drill in ultra-deep waters, and all of these are fully utilised under long-term contracts.

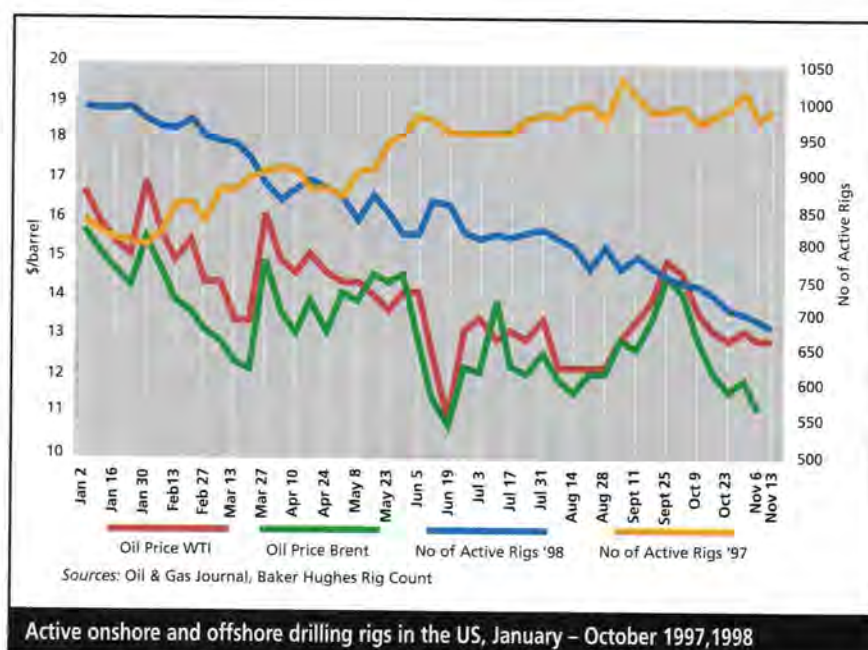
Deepwater fields already in production, or about to start, are unlikely to suffer cutbacks. These are low-cost producers, partly because they are currently excused from royalty obligations – which are lower than elsewhere anyway – until output reaches a given amount, and partly because well productivity is high. The experience gained from the installation and use of different production methods, such as TLPs, spars, compliant towers and subsea systems, has sharply reduced deepwater development and production costs.

Sensational news, however, is unlikely to come from Gulf deep waters in 1999. The recent pattern is one of bringing a few fields annually onstream, some with relatively small reserves. None of the fields which began production in 1997 and 1998, including Shell's Mensa and Ram Powell, BP's Troika, and Amerada Hess's Baldpate, are large and two – Oryx's Neptune and British Borneo's Morpeth – have recoverable reserves only about 75mn boe.

The fields expected to start production in the next two years, such as Shell's Angus, Macaroni and Europa; Exxon's Hoover and Diana; Elf's Virgo; Amoco's Marlin; and British Borneo's Allegheny are of the same ilk. The only apparently large field, whose development plans are still uncertain, is Llano, operated by EEX.

Subsalt revival

It is reasonable to expect that new fields will be discovered in 1999, although the odds that any of these will be major finds are small. An interesting recent development, however, is the revival of the sub-salt scene. The enthusiasm which followed the discovery by Phillips and Shell of the



Active onshore and offshore drilling rigs in the US, January – October 1997, 1998

Mahogany and Enchilada fields in the early 1990s ebbed after a series of very expensive dry holes, with Texaco's Gemini field the only new development. The picture became brighter this autumn with Anadarko's announcements of discoveries of the subsalt Tanzanite and Hickory fields.

Elsewhere, production is expected to continue at its present pace in the older, large California oil fields, as are efforts by Arco, BP and Anadarko to develop new fields in Alaska before the precipitous drop in Prudhoe Bay output threatens the life of the TAP pipeline. No one expects much interest in costly heavy oil and shale deposits or in high-cost, deep reserves of natural gas.

Disputes with the government

The Clinton Administration's opposition to oil and gas activities in the Alaskan ANWR (Alaska Naval Wildlife Reserve), as well as elsewhere, is sure to continue. Its only concession – opening a section of the Alaskan Naval Petroleum Reserve (NPR) for exploration – is expected to result in a lease sale this summer. As development of any discoveries made in the NPR is likely to take 8 to 10 years, current oil prices are not expected to affect interest in this sale.

On other fronts, companies cannot expect any relaxation of EPA (Environment Protection Agency) emissions regulations, due to come in force shortly, which will involve refiners in considerable adjustments and capital expenditures. The fate of the Kyoto Protocol, which US oil companies strongly oppose, is hard to predict. The administration may try to impose remedies administratively if the Senate fails to ratify the protocol.

Where companies have a fighting chance is in their dispute with the administration over the way royalties should be assessed. The MMS (Maritime and Marine Service), insisting that royalties calculated on posted prices does not reflect the true value of the oil produced on federal leases, has proposed and revised a complex rule that would tie royalties to NYMEX (New York Mercantile Exchange) futures indexes.

Oil companies are very critical of this idea and suggest that the MMS takes royalties in kind (RIK) rather than as cash. The MMS vehemently opposes RIK on the grounds that it has little access to processing capacity and pipelines, and limited marketing experience. Oil companies point out that the government can do what they do, and rely on private sector marketers.

In the final hectic days of the 105th Congress, the RIK bill never came to a vote and the MMS was prevented from issuing its new royalty valuation rule until June 1999. Once the new Congress gets going, a new RIK bill will emerge and battle lines will be drawn. The MMS has added fuel to the fire by threatening to raise the royalty rate for deepwater production from the current 12.5% to 16.6%, the usual rate for onshore and shallow-water output. This seems unlikely to happen under current circumstances as it would almost certainly increase US dependence on imports of foreign oil. On the other hand, attempts by oil companies to get relief from taxes on marginal wells and to get tax credits for the use of enhanced oil recovery seem equally unlikely of success, given current federal budget restrictions.

Tide yet to turn for gas tanker trade



Over the past year the gas tanker market has been subjected to the same downside pressures as have beset the oil tanker sectors, deriving primarily from the Asian economic downturn. Weak end-user consumption has depressed demand and low product prices have squeezed margins. While there have been some bright spots, most notably in south-east Asia where structural changes in trade have worked to the benefit of certain types of gas ship and in China and India where LPG import volumes are still rising, most gas ship operators have had a difficult year, reports *Peter Mackay*.

LPG tankers depend for employment on production of, and demand for, refined products – not only LPG from the oil refining sector but also base products from petrochemical plants. As such 1998 has been characterised by weak demand and low prices, in common with other segments of the petroleum product market. Ammonia trades, which provide an important non-associated market for medium-size LPG tankers, have also been disrupted over the past year by the economic problems in Russia, one of the world's major exporters.

LNG sector biding time

LNG is a separate market entirely, being a primary energy source used by gas and electricity utilities. LNG tankers are normally employed on very long term contracts and, as such, the existing LNG fleet has in fact been little impacted by the downturn in energy demand in Asia. The main effect has been to delay orders for additional ships. This past year was expected to see a number of significant LNG tanker orders, most notably the next tranche of newbuildings for Korean imports and a further round of ships to handle the projected expansion of Australia's North West Shelf project. In the event, both of these orders have failed to appear and, given the low level of interest on the part of buyers for additional import volumes over and above those already contracted, it may be

some time before interest can be reawakened.

There is a growing feeling that, when new demand for LNG does appear, it will be structured differently from the market up till now. Some observers suggest that the LNG tanker sector will also be structurally different and that there will be room for a more speculative approach to LNG tanker ownership. However, these ships are among the most expensive afloat and even ageing secondhand tonnage, when it does change hands, is extremely costly. It would take a great leap of faith before the LNG tanker market offers any sustainable spot or short-term business.

Tough times ahead for LPG

The market for very large gas carriers (VLGCs) – those of 70,000 m³ capacity or more – bears some similarity to that for LNG ships. Trading opportunities involving such large cargoes of LPG are limited and most vessels in this sector look firstly for Arabian Gulf to Far East business; failing that, Brazil offers an important discharge point and there are still cargoes to be had from North Africa to the US. The sector's dominant owner, Bergesen dy ASA of Norway, managed to achieve full contract cover for its fleet of VLGCs throughout 1998 and has 60% coverage for 1999. This brings stability of earnings, since the company's freight income is fixed, at least for the current year, and Bergesen actually increased its net timecharter

income slightly in 1998 from the 1997 level. This dependability is an important consideration for stocklisted shipowners and especially so for Bergesen, whose dry bulk carrier fleet has been severely hit by the dramatic slump in earnings in that sector.

While indications are that Bergesen has managed to renew or replace existing contracts at rates close to those in place before, the underlying weakness in Asian demand for LPG, whether for energy production or for use as a chemical feedstock, bodes ill for the sector in the near term. What is more, the past year has seen a return to newbuilding orders with 12 VLGCs now listed for delivery and a number of options outstanding. Most of these are for Japanese owners but Bergesen has placed an order for two ships at Gdynia in Poland and has options on four more. Without an upturn in demand for these vessels there will need to be some scrapping of older vessels beginning within the next two years if the market is not to suffer further.

The market for medium gas carriers, which Bergesen again dominates since its takeover of Havtor at the end of 1995, has been more sharply affected. Bergesen reports that timecharter income in 1998 was off by some 20% compared to 1997 as cargoes were hard to come by, both for LPG and ammonia, and a number of newbuilding deliveries into the fleet disturbed the supply/demand balance. The current orderbook includes six 20,000 m³ vessels with ethylene capacity, ordered before the Asian crisis hit. The added cost of building LPG tankers to be able to carry ethylene at temperatures of -104°C – as against -43°C for propane – means that these vessels will struggle to be profitable if the projected level of long-haul ethylene imports into the Far East fails to materialise.

Restructuring market

The highly concentrated nature of the VLGC market aids stability and this has not gone unnoticed by major operators in other segments. The past year has seen a significant restructuring further down the size range where Danish owner/operator AP Møller has developed its existing Mærsk Tankers operation into a pool for its own fleet in the 15,000 m³ to 20,700 m³ range combined with similar vessels owned by Bernhard Schulte and Ultragas.

AP Møller also acquired three gas tankers from Westfal-Larsen and has taken over management of two Latvian Shipping newbuildings that had initially been entered in the Westgas pool.



Other vessels have been chartered into what is now a 25-ship pool that dominates this size range.

LPG trading niche

Ships of this type, being semi-refrigerated, depend largely on petrochemical gases for their cargoes. However, during 1998 volumes were short, particularly on long-haul trades, and more Mærsk Tanker vessels were employed in LPG. Long-haul spot business carrying vinyl chloride monomer (VCM) into the Far East, for example, has been almost non-existent this year.

As a result, the Mærsk pool has, almost by accident, found itself a niche in medium-haul and intra-regional (especially Asian) LPG movements although concern over recent additions to the fleet persist. More scrapping is needed and further concentration of ownership or operation via acquisitions, mergers or pool arrangements is likely. A major shift in the pattern of trade in the Asia-Pacific region has evened out product flows, which means that, while fewer ships can find work there, those that are positioned in the region can expect more stable employment and are enjoying more backhaul work than was previously the case.

Bergesen has also reported an increase in intra-regional propylene trade in Asia, which has provided some work for its Igloo and Handygas fleets in the 8,000 m³ to 15,000 m³ size range.

Increased competition

A similar process of concentration is desirable in the smaller ship sectors, especially in Europe where the lack of consolidation is causing increasing price competition, according to Norwegian Gas Carriers (NGC). Again, this situation has been exacerbated by a surplus of

new tonnage becoming available, fleet additions which could have been assimilated had demand continued to increase at historic rates.

On the other hand, this year's scheduled deliveries should keep pace with demand and currently there is very little tonnage on order for delivery in 2000 or beyond. Combined once more with changes to the pattern of trade in Asia this might offer some optimism.

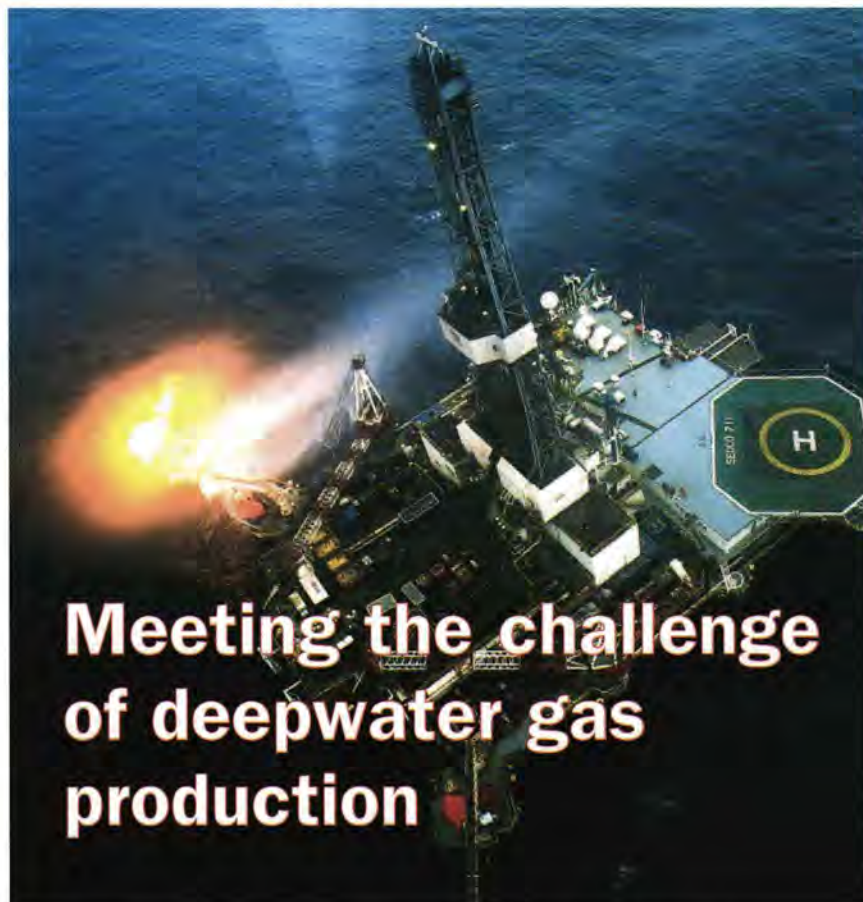
However, there is concern that the low prices being offered by Korean yards at present, along with efforts being made by Chinese yards to position themselves as low-cost builders of smaller gas ships, could encourage owners to order in anticipation of an upturn in demand and further destabilise the market.

Facing the future

On the whole, gas tanker operators are not optimistic of any great improvement in their fortunes this year. The outlook for product demand remains weak and so long as the price of oil continues at current levels there will be little incentive for arbitrage trade. Margins on product trades remain tight, which keeps a lid on potential freight earnings.

The key to a recovery is obviously the Asian economic situation; should the climate improve and feed through to a more bullish trading environment generally, then gas tanker operators will benefit along with their counterparts in the oil and product tanker markets. Such a scenario is not thought to be on the cards for this year and operators have accepted that they will have to wait until 2000 at the earliest before things get much better.

Main picture: Tanker loading LNG in Australia. Above: Recent LNG newbuild for Abu Dhabi



Meeting the challenge of deepwater gas production

Enterprise Oil's successful appraisal of the Corrib gas discovery off the west coast of Ireland has provided a welcome fillip to the country's lacklustre exploration record and could herald a major new gas province off the west coast of Ireland. Gas field developments in this region would find ready markets both north and south of the Irish border. However, the deep water and hostile environment of the Atlantic present a challenge – a conventional fixed production platform would not be practical in these depths. *Jeff Crook* looks at the possible solutions.

Enterprise would be able to draw on the experience of its field partners, Saga Petroleum and Statoil, for development of Corrib – both companies have adopted innovative solutions for developing fields in the deep and hostile waters off the coast of Norway. Saga has a 40% stake in the Corrib block 18/20 and Statoil has a 15% interest. Saga is also operator of four blocks in the Rockall Trough in the Irish sector with water depths ranging from 1,000 to 3,000 metres, and formed a deepwater alliance covering this region with TOTAL last year.

The Corrib discovery lies in the Slyne Trough in water 350 metres deep,

located 70 km from Achill Island. The discovery was made in October 1996 but Enterprise says that this well could not be tested due to mechanical problems. A 420 sq km seismic survey was carried out after the discovery was made, and an appraisal well was drilled in 1998. Enterprise announced in September that same year that the appraisal well had flowed at a rate of 63mn cf/d of gas.

John McGoldrick, General Manager for Enterprise in Ireland, said: 'This is a very good result and we are extremely pleased with the high productivity by the well test. This success confirms the potential of the area. Further appraisal

drilling will be required before development plans can be progressed.'

Great sales potential

If development plans can be progressed there is great potential for gas sales. Gas demand in the Irish Republic is currently satisfied by output of around 250mn cf/d from the Marathon-operated Kinsale Head and Ballycotton fields, south of Cork, and with gas transmitted through the UK-Irish Interconnector. But the economy of the Republic of Ireland has been growing rapidly and Kinsale Head has a finite life span. There will also be increased gas demand for power generations. The Northern Ireland power utility, Viridian, has recently unveiled proposals for a 300MW gas-fired power station to be built near Dublin.

The Good Friday peace agreement would also benefit gas trading with Northern Ireland. The natural gas market in Northern Ireland was stimulated by completion of the Scotland to Northern Ireland pipeline in 1996. Gas demand was significantly increased during construction of this pipeline by conversion of the Ballylumford power station from oil- to gas-firing. Work is also progressing on extending the domestic gas transmission system in Northern Ireland.

Meeting the challenge

While there appears to be a ready market for gas from the Slyne Trough there are challenges to overcome, particularly for gas field development. Oil production has already been achieved in the Atlantic Frontier by BP's Foinaven and Schiehallion floating production, storage and offloading (FPSO) vessels. These FPSOs are moored in 350 to 500 metres of water, West of Shetlands, making them the first fields in the UK sector to depend on diverless technology.

The water depth meant that remote operated vehicles (ROVs) needed to perform all subsea installation and maintenance tasks. The ROV operations were further complicated by ocean waves 10 to 20 metres high, currents of up to 2 metres per second and freezing seabed conditions. The pioneering work on these BP fields means that contractors have the necessary subsea skills for gas developments in the Slyne Trough.

One of the most complex deep water tasks is to make pipe connections on the seabed. The technology for diverless connections on Foinaven and Schiehallion was developed as part of the Diverless Maintained Cluster (DMAc) project. The first underwater

trial of the flowline pull-in system was carried out in Fort William in 1991. Each pipe connection is made by pulling a flexible jumper into position by means of wire rope, with a winch on the ROV providing the power.

Gas development will, however, provide additional technical and operational challenges. The need for a gas transport pipeline is an obvious requirement. Less obvious, however, is the stricter criteria for reliability. Unlike oil which may be sold on the spot market, gas is produced to meet day-to-day demand. There could be financial penalties for failure to supply the contracted volumes. This means that an emergency shutdown during a severe winter storm could result in a large financial loss to the operator. (In contrast, some FPSOs are actually designed for shutdown and disconnection during severe conditions).

The harshness of the Atlantic environment was illustrated in November last year when the *Schiehallion* FPSO suffered bow damage by 15-metre waves. BP reported that 30 non-essential staff were airlifted from the vessel and production was shutdown during the storm. The event led the environmental campaign organisation Greenpeace to protest to the UK Health & Safety Executive about safety in the Atlantic Frontier.

Semi-sub solution

In any event, ship-shaped vessels, like the Foinaven and Schiehallion FPSOs, are unlikely to form a good basis for gas field development because of the limitations of the swivel systems that enable them to weathervane (turn into the weather). Semi-submersibles provide a better solution for gas production. The submerged pontoons provide a relatively stable platform allowing the semi-submersible to be spread moored (moored in a fixed direction). Flexible risers can thus be connected to the facility without the need for a swivel. This enables export risers of up to 16 inches diameter to be used.

Advances in flexible pipeline technology have enabled the output of these floating units to be greatly increased over the past decade. Statoil, one of Corrib field partners, is currently building a semi-submersible gas production platform with gas production capacity of over a billion cf/d for Åsgard. This enormous capacity will be achieved by exporting gas through a 16-inch diameter flexible pipeline to an export manifold on the seafloor. A 42-inch diameter export pipeline will run from this manifold to mainland Norway. (A second flexible riser is provided for redundancy).



Main picture and above: Corrib appraisal well test. Photo courtesy of Enterprise Oil.

The \$5bn Åsgard project involves three connected floating facilities. They will be used to develop the Midgard, Smørbukk and Smørbukk South fields on the Halten Bank, off mid-Norway. The water depth is over 300 metres. Åsgard A is an FPSO for developing the oil reserves in Smørbukk and Smørbukk South, Åsgard B is the semi-submersible platform for gas production from Midgard, and Åsgard C is a condensate storage unit.

Taking a look at TLPs

Enterprise could look to its other field partner, Saga Petroleum, for experience of tension leg platforms (TLPs). The first TLP was used by Conoco for development of the Hutton field in 148 metres of water in the UK sector, in 1984. The basic concept is to apply tension to steel tethers to force a floating platform down towards the seabed – this provides a platform that is sufficiently stable to enable well components such as Xmas trees, to be located at the surface. A TLP also enables rigid export pipelines to be installed for export of oil and gas.

Though Hutton remains the sole TLP in the UK sector this has become a popular method of developing deep water fields in the Gulf of Mexico. Shell has recently deployed around half-a-dozen TLPs for deep water developments in the Gulf of Mexico, including the \$1bn Mars field with a depth of 896 metres. British Borneo has used a smaller SeaStar monohull TLP for its \$250mn Morpeth project in 500 metres of water in the Gulf of Mexico. However, the design of TLPs for more hostile waters is a somewhat greater challenge.

Saga has experience of TLPs in Norwegian waters with its Snorre tension leg platform. This platform was the

first truly deepwater platform in northern Europe when it came onstream in August 1992. It stands in around 320 metres of water 200 km west of Florø. The steel semi-submersible platform is held in position by 60 steel tethers connected to four anchor bases on the seabed. Tension is applied to the tethers by machinery in mooring compartments in each of the platform legs.

More recently, Saga Petroleum decided to recommend a TLP rather than an FPSO for development of the gas condensate fields on Halten Bank South off mid-Norway. The Halten Bank South project involves the integrated development of the Kristin, Lavrans, Trestakk, Tyrihans South and North fields. Saga says that the TLP will be located in the Kristin Field in 340 metres of water with subsea wells on other fields being tied back to it.

Subsea and shallow water

Another option for development of deepwater gas fields is to install subsea wells in deep water and connect these back to a shallow water platform. This solution was adopted by Shell and its partners for the Malampaya development in the Philippines (see *Petroleum Review*, November 1998) where wells at depths of 850 metres are connected back to a shallow-water platform, standing in just 43 metres of water.

Shell had previously gained experience of long distance subsea tie-backs with a 109 km tie-back for its \$280mn Mensa project in the Gulf of Mexico. This tie-back was a considerable advance over the previous tie-back records. The great depth of this field, 1,615 metres, also provided a test bed for guidelineless subsea intervention.

Low oil prices dictate industry restructuring

The recent large-scale oil company mergers can leave no one in much doubt that the industry is entering a dramatic phase of consolidation, which is likely to have changed the face of this business as we enter the next century, according to Mark Lewis Managing Director of consultants EMC.

The catalyst for the potentially fundamental shakeout in the oil industry has been the slump in oil prices and the widespread belief that the down-cycle could last years rather than months. Yet are the current operating conditions so much worse than those of the mid-1980s, when prices tumbled from their heady levels of \$30/b plus to the low teens in a matter of months?

The industry survived these traumas virtually unscathed – so why are companies, which only a short while ago were competing toe-to-toe, suddenly deciding to throw in the towel and succumb, with almost unseemly haste, to the abandonment of their independence? In order to address this question, it is necessary to consider the existing oil industry structure and to understand where it was heading.

The companies we are concerned with here are the US and European multinationals, which opened up the international industry in the post-war years and became household names across the globe. These companies also represent the most visible, and in many ways most vulnerable, part of the business with high profiles, widely traded shares and potentially fickle shareholders. There are other groups of operators in this business, however, which although suffering from the same market pressures, are likely to react in different ways.

Although long past their peak power, the traditional 'Atlantic Basin' international operators, let's call them the 'mainstream multinationals', still play a substantial role in the international business. Despite the loss of control over much of the global reserve base in the 1970s, these companies still account for around 40% of the world's products sales (outside the FSU), a market share which, although declining in the 1980s, has changed very little this decade (see Figure 1).

In contrast, the group's share of the world's refining business has been steadily falling from about 37% in 1980, to no more than 27% currently. If these shares are compared with that of equity oil production (where the group only accounts for about 16% of the world total), the extent of the de-integrated nature of the business is evident. What is also apparent is the growing disparity between the two phases of the downstream business, refining and marketing. The widening gap between ownership of refineries and selling finished products meant that this group of companies relied on third party refiners for a substantial part of their day-to-day products requirements. Although this undoubtedly provides short term economic benefits, it seems an untenable long-term position.

Rates of return

This imbalance between the upstream and downstream would not matter so much if it were not for the fact that it is in inverse proportion to profitability – rates of return in the upstream being consistently greater than the downstream. This weighting towards E&P reached the point in the past few years when about three-quarters of these companies' total income (excluding petrochemicals) has been derived from the upstream.

Not surprisingly, a similar trend is evident for capital expenditure, with a consistent decline in the proportion allocated to the refining/marketing sector, from around one-third in the early 1990s to no more than 25% in 1997. Part of this downstream investment has, moreover, been 'forced' on the companies as a result of environmentally related tightening in product specifications.

This inexorable shift towards the upstream in terms of income and invest-

ments was set to continue, no matter what happened to oil prices, since nearly three-quarters of these companies' refining assets are located in the mature, slow growing and highly competitive markets of North America and Europe. This geographically narrow downstream operating base was set to continue since there has been a growing reluctance to invest in new refinery projects outside their core Atlantic Basin markets. An analysis of firm (ie committed) new refining projects in Asia-Pacific, for example, which despite the recent problems is the most dynamic region in terms of new refining investment, reveals the mainstream multinationals' equity share at less than 10%.

The underlying disparity between the profitability of the upstream and downstream has thus been the main factor driving industry strategy for the mainstream multinational companies. The superior rates of return from the upstream business are partly the result of relatively high crude oil prices over the past few years, but also reflect the discrepancy in cost-cutting efforts. The success in reducing costs in E&P, partly through technological developments, contrasts sharply with the difficulties faced in the refining sector, where the only way of achieving efficiency gains of real substance has been to close or dispose of capacity.

Upstream dependence

In essence, therefore, these companies have been following a path which has made them increasingly dependent upon the upstream to generate profits, most of which have been ploughed back into the sector in the quest for new reserves and higher production. This has left them especially vulnerable to a drop in oil prices, which has now happened with a vengeance.

This vulnerability has, moreover, been heightened by the extent to which companies have virtually eliminated diversification in their businesses and already streamlined their management. Much of this cost cutting and asset disposal was a reaction to the last oil price crash in the mid-1980s. Although this enabled companies to survive, these asset sales and elimination of some of the excesses of overstaffing and overspending which were a legacy of the 'windfall profit' days of the early 1980s, were one-off measures which cannot be repeated this time around.

The current downturn in prices is thus having a much more fundamental and rapid impact on the industry. Profits for the main multinationals have already shown a massive drop this year, which is

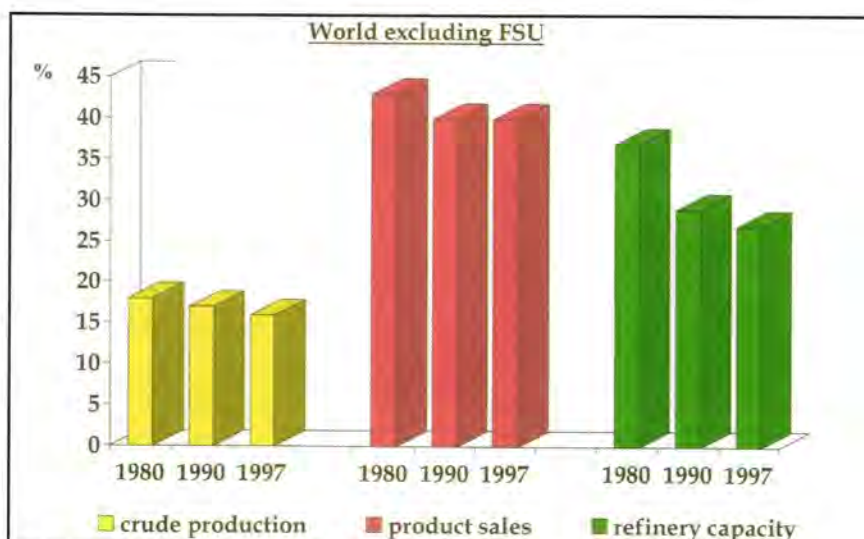


Figure 1: Mainstream multinationals' market share

feeding through to capital expenditure (see **Figure 2**). At some stage this will show up in the form of reduced reserves which mark the death-knell for individual oil companies.

A broad assessment of the potential impact of sub-\$15/b oil prices on investment levels and discovery rates can be made by examining developments over the past few years. Since 1993, when the Brent price averaged just over \$18/b, our group of 20 'mainstream multinationals' have invested a total of about \$11.3bn/y on exploration expenditure. The result was an annual addition to oil and gas reserves of about 7.3bn boe on average.

At \$14/b for Brent, available funds for exploration expenditure can be calculated to fall to around \$7bn/y. This implies, assuming a similar relationship

of per-barrel finding costs as evidenced in the past few years (but also assuming continued improvements in efficiencies), that new reserve additions are likely to average less than 5bn boe/y.

With aggregate oil and gas production for this group of companies currently averaging about 7bn boe/y, the inevitable implication is that reserves will show a sharp fall, although the effect could take some time to appear in companies' annual returns.

It is still too early to assess the overall cutback in capital expenditure this year but earnings have already been hit hard – 13 of the 'mainstream multinationals' having reported a collective drop in net income of nearly \$10bn for the first three-quarters of the year, compared with the same period in 1997.

The pressure for oil companies to

merge is thus not only the result of attempts to seek new scope for cost-cutting, underlying it is also the need to offset the impending drop in reserves. So far the most significant moves towards consolidation have been in the high-profile 'mega-mergers' but increasingly we can expect to see members of the weakest sector of the international business, the independent upstream operators, falling by the wayside, either selling off their prize assets to hungry predators or merging amongst themselves. The longer the oil price stays low, the more intense the pressure becomes.

Defensive strategy

The move towards consolidation amongst the larger multinationals is thus primarily a defensive strategy, rather than a return to the 'traditional' values of 'big-is-better' which characterised the early years of the industry, and which was mainly driven by the rationale of forward integration by crude-long operators. Although there are still economies of scale in this business, they mainly relate to the downstream.

But what about the rest of the industry? Whilst the 'Atlantic Basin' companies have become increasingly upstream orientated, many of the producer-state companies have been following strategies aimed at becoming more integrated. An inherent part of this process is the gradual 'commercialisation' of state oil companies – a development, which followed to its logical conclusion leads almost inevitably to privatisation. In its broad sense, this process is evidenced, not only by PDVSA's expansion into the US downstream, or Aramco's purchase of Asia-Pacific refining capacity, but also Petronas's acquisition of Engen and Lukoil's involvement in east European refining.

Another part of the same picture is the opening up of upstream opportunities in countries previously closed to foreign companies. This, in particular, can be expected to gather pace in a low oil price environment as producer governments grapple with the problems of revenue shortages. Any such move, however, will of course divert investments away from the high-cost non-Opec areas, increasing the prospects for an impending fall in production from these regions.

Low oil prices are thus intensifying the gradual underlying shift in the centre of power of the global oil industry, away from the traditional multinationals towards emerging new 'majors', with access to reserves and who are seeking global, integrated businesses. *Plus ça change!*

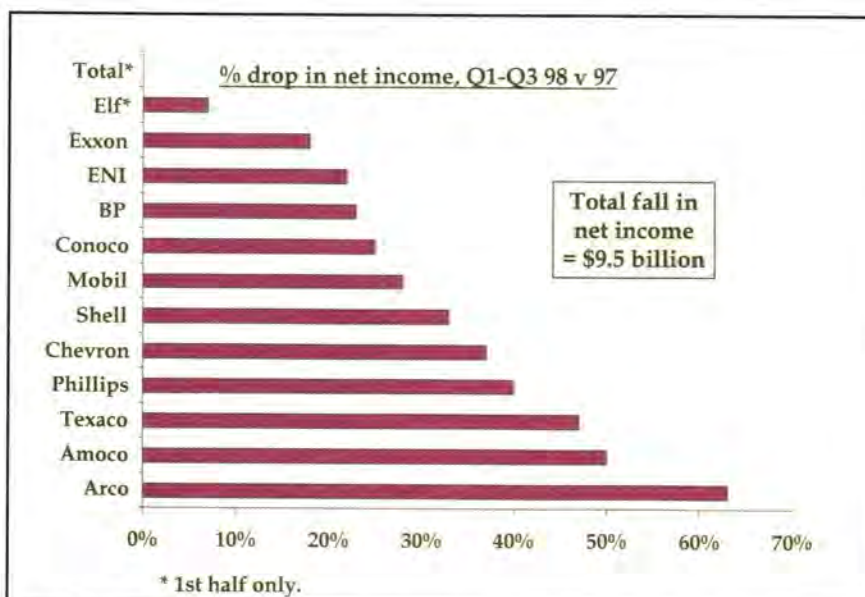


Figure 2: Impact of low prices on earnings

Sakhalin proving its Asian supply potential



Sakhalin Island, a closed outpost of Far Eastern Russia until 1990, is potentially one of the world's most exciting petroleum exploration areas. It features over 20 sedimentary basins in the Sea of Okhotsk. First offshore oil production is scheduled for 1999, and it will be a few years before the revival of Far Eastern hydrocarbon demand can unlock Sakhalin's huge strategic potential as an exporter to much of the region, writes *Mike Wells*.

Many long-term foreign investors feel that Russia's economic collapse will hasten clarification of the petroleum legislation, the Enabling Laws, because of the Federal Government's need for oil income, as stated recently by Russia's Prime Minister.

Russia's newly appointed Deputy Minister of Fuel and Energy, V Z Garipov, told IBC's recent conference in London on Sakhalin oil and gas that if the companies could be patient and 'if we can beat the Duma at the end of 1998/early 1999, we should get all the amendments we require'. A leading geophysicist, he said the 20,000 sq km of the island's offshore shelf already contained an estimated 720mn tonnes of oil and condensate and 2.5tn cm of gas, which

would meet the demands of Russia's entire Far East Region, as well as providing considerable export capacity.

Numerous challenges

The Sakhalin region itself is suffering dire financial problems. It has a history of neglect by Moscow which has resulted in a poor infrastructure, and it is now creating a foreign economic structure from scratch, based on a population of about 650,000. Although shelf water depths are mostly less than 200 metres, the island's east coast presents one of the hardest offshore operating environments in the world, with thick and active sea ice limiting the working season, and heavy storms and earthquakes; all of which will call for innovative engineering.

Sakhalin's first onshore hydrocarbon discoveries go back to 1923, and comprise some 40 fields which was expected to produce about 1.56mn tonnes in 1998. Offshore drilling commenced in 1975 under a general agreement with Japan's Sodeco, resulting in the discovery of the Chaivo and Odoptu fields in what became the Sakhalin 2 area. But after Sodeco ended its financing agreement in 1982, the area's potential was greatly boosted by two of the first and only production sharing agreements (PSAs) in Russia in 1996: for Sakhalin 1 and Sakhalin 2 respectively. These two projects Garipov said, seek to develop five offshore oil/gas/condensate fields with reserves totalling 512mn tonnes of liquids and 1,120bn cm of gas.

Sakhalin 2 development

Sakhalin 2 will be the first to come into first-stage production, in July 1999. The current development agreement involves Piltun-Astohskoye (oil and some gas) and Lunskeye (gas with some condensate) fields where joint reserves are about 1bn barrels of liquids and 4tn cf of gas. The PSA development consortium Sakhalin Energy Development Co (SEIC) comprises Marathon, the operator with 37.5%, Mitsui 25%, Shell 25% and Mitsubishi 12.5%. Foreign investment in the project was expected to be \$443mn in 1998, climbing to \$796mn in 2000.

Total investment by the consortium is an estimated \$10bn, of which \$800mn is being spent on the early oil phase involving a platform installed 12 km offshore on Piltun-Astohskoye. This platform, Molikpaq, is drilling through the ice-bound winter with a targeted 12 production wells in time for early production to flow at rates of 90,000 b/d for the six months' summer and ice-free season, when tankers can access the floating storage. SEIC says the platform incorporated some innovative engineering, which is understandable when the designer was one of Russia's nuclear submarine institutes.

Garipov put Sakhalin 2's output, based on feasibility studies, at 740,000 tonnes in 2000, rising to 9.05mn in 2005 and 6mn in 2010. He expected first gas to total 15.5bn cm/y from 2005 and to maintain this flowrate beyond 2010.

Meanwhile SEIC is currently building up the non-existent local infrastructure to accommodate earthquake-resistant offices and other supply facilities. It is also preparing for year-round oil production in the second phase, two years later, by installing a 780-km pipeline to a terminal at Prigorodnoye, a future ice-free port in the south end of the island. Exxon's Sakhalin 1 development may also join in with this line, although it is also looking at a possible shorter route.

But John Conlin, SEIC's President of the

project emphasises that before this second phase can go ahead there has to be an agreement in 1999 with other potential Sakhalin offshore producers on sharing of infrastructure costs and some repayment of the \$1bn which SEIC has already spent as the first developer on the scene.

He also said the development will not move on without enabling legislation, 'with proper removal of ambiguities and proper established approvals' from the authorities. In order to achieve the work done so far, SEIC had to go through more than 80 government ministries and agencies for more than 500 specific approvals and licences. 'The problem is that this was a first-time application on legislation framed for other purposes; and the lack of development communication between Federal and Regional bodies, although the Sakhalin administration has been a great help,' he commented.

Sakhalin 1 project

The other current project, Sakhalin 1, is a \$15.2bn joint development as a single unit of the Chaivo (mainly gas and some oil, and a 'world class gas resource' according to the operators), Arktun-Dagi (mainly oil and some gas) and Odoptu (smaller oil and gas) fields. Exxon Neftegaz is operator for the consortium with Sodeco, Sakhalinmorneftegaz (SMNG) and Rosneft. Deputy Minister Garipov said the project will have annual production peaks of 26.5mn tonnes of oil and 21bn cm of 'free gas'. Based on the feasibility study, oil output would begin in 2005 at 7.7mn tonnes rising to 20.897mn tonnes in 2010.

But first the Sakhalin 1 consortium has many problems to resolve, apart from the necessary legislative amendments. The oil reservoirs are geologically very complicated, and fewer oil reserves have been located than expected, so the emphasis for the future seems to be swinging to gas. However Rex Tillerson, President of Exxon Neftegaz said by the end of this year \$350mn will have been spent. Six appraisal wells have been drilled on Arktun-Dagi but reservoir quality and continuity remain uncertain, and current plans involve continued evaluation of field data and improvement of the field description model.

The challenges, he said, include achieving further cost reductions and defining a cost-effective development plan. This meant dealing with severe environmental conditions including four to six months of sheet ice up to 2 metres thick every year, with ice ridges up to 25 metres high, and wind and waves close to North Sea conditions, whilst progressing to an integrated oil and gas development with the two fields.

But Tillerson emphasised: 'Russia's

current economic crisis has added new challenges and undermined stable long-term supplies', with progress moving more slowly than originally planned.

Development potential

Seaward of the Sakhalin 1 and 2 areas, Mobil/Texaco has a protocol PSA for the Kirinsky oil fields, with Rosneft and Rosneft-SMNG brought in on a subsequent preliminary agreement. However the Duma has not yet approved it as a full PSA, despite a resolution to that effect being passed in January 1998. The project actually involved three fields: Ayashky, East Odoptu and Kirinsky, where preliminary estimates by the operators put total 'most likely recoverable reserves' at 50mn tonnes (3.4mn barrels) and 720bn cm. This could make it the largest oil field yet discovered on the Sakhalin shelf. But they say that if it is found that the prospect contains mainly gas, 'there is a possibility that it would be as large as 970bn cm recoverable'.

This was the first time that bidding was held on Russian areas which had not shown any considerable explored hydrocarbon reserves. Currently a \$17mn 3D survey is being conducted on Kirinsky, and \$151mn of further exploration will follow. Total development costs are an estimated \$6.4bn.

Garipov said work is also underway to prepare PSAs for Sakhalin 4 and a number of other projects up to Sakhalin 9. The former lies off the northern tip of the

with recoverable reserves of between 40bn to 45bn tonnes each'.

Other official project areas range from the southern waters of the island round to the Tatar Strait bordering Khabarovsk. He said these areas account for only 15% of probable hydrocarbon reserves, and no large fields are currently anticipated. Preparations for implementation of Sakhalin 4 to 9 have not yet begun as their fields are not included in the list which grants PSAs.

Into the future

Looking some years ahead, the Deputy Minister stated that the development of Sakhalin 1 and 2 alone 'will make it possible by 2005 to install a gas supply network in all the Sakhalin, Khabarovsk and Primorsky Provinces, where currently only 10% of existing demand for gas is satisfied, as well as to provide adequate feedstock for refineries in the Far East which require 12mn tonnes of oil annually, and to give up import of oil from Tyumen'.

There are a number of current proposals for exporting Sakhalin gas, including a total of about 14mn tonnes of LNG from startup in 2008, to Far Eastern markets. Sakhalin has a good strategic location. Japan's northern island of Hokkaido is less than 50 km across the southern strait, and China, Korea and Thailand, as well as India and Indonesia further afield, are other potential markets once Asian economies and hydrocarbon demand have recovered from the current eco-



island, and includes two main areas, Schmidtovsky and Astrakonovsky, and a number of other prospects on the northwestern part of the shelf.

Arco and Rosneft SMNG have formed an alliance in this area, with a first exploration well on the latter field planned for 1999. And earlier in 1998 BP and Rosneft SMNG got together to explore the Sakhalin 5 area north of the island, where first seismic is planned on East-Schmidtovsky before they bid for licenses.

Garipov listed Sakhalin 6's Pogranichny area off the southeast as having 13 prospective oil-bearing structures including 'two gas/condensate fields with approximate reserves of 220bn cm of gas and 17mn tonnes of condensate, as well as two oil fields

conomic crises. SEIC's phase three development plans include a large 8.9mn t/y LNG plant at Prigorodnoye on the southern tip. Exxon and Sodeco have a Sakhalin 1 proposal to build a gasline to Japan, avoiding the more rigid long-term LNG contracts, and feeding independent Japanese power generators freed by deregulations, and it is also looking at a gas line to eastern China.

Deputy Minister Garipov said that Far Eastern demand for gas over the next 20 years would still be so great that it was not a matter of pipelines versus LNG, there was room for both.

Main picture: Testing equipment for a new well on Anviva gas field, Yuzhno Sakhalinsk, Sakhalin. Above: Kholmsk Port, Western Sakhalin

From Mobil to Exx-Mobil: Pegasus gets his wings clipped

Mobil was thought to be long on brains and short on crude. But when it became apparent that the industry might have to live with crude at \$12/b more or less indefinitely, the company's endowment of grey matter proved insufficient to save its assets, writes Peter Adam in a very personal view of the Exxon-Mobil takeover.

Despite turning in a relatively strong performance under Chairman Lucio Noto – and doing all Wall Street asked of it – Mobil was driven into the arms of its major US competitor Exxon in December 1998. Belying all the spin about how the company is somehow being saved by the merger, long faces and gallows humour are the order of the day at Mobil's Fairfax, Virginia, headquarters. While not expecting a 'pink slipmas' this year, many Mobil employees know the axe will fall disproportionately on them, probably sometime before the middle of this year.

Structural imbalances

More so than its ex-Standard Oil sister companies on the international scene, Exxon and Chevron, Mobil was crude short and had a refining deficit. This meant that it was more reliant on the Middle East, particularly Saudi, for its supplies than any other US major, and dependent on other refiners for product to market through its system. Mobil turned its crude-weak position to its advantage in the 1970s by cultivating a special relationship with Saudi Arabia. The enormous profitability of its operations there, in addition to cash spun off by the Arun gas field in Indonesia, helped sustain the company for decades. And Mobil's supposedly savvy marketers and traders often, but not always, wrung profits from the company's downstream operations.

But Mobil passed on the downstream deal that the Saudis wanted in the 1980s, ceding it to Texaco. As downsizing decimated the ranks of its employees, the quality of those who stayed on became

increasingly uneven. And as banks and trading houses stepped up petroleum related activity, many of its good traders left. Who could blame them?

For a while Mobil was thinking about trying to form a special relationship with Iraq, the way it had done with Saudi, but then Saddam Hussein marched into Kuwait. Although both its upstream deals in Central Asia and its beefed up presence downstream in the Far East won kudos, as Asia's economies weakened, the contagion spread and crude cratered in a deflationary spiral, cash seemed less and less likely to flow generously from either area for a good while.

Totem and taboo

Meanwhile, Mobil, like most petroleum behemoths, continued to believe in the ethos that bigger is always better. Thus, the possibility of breaking up the company was always a non-starter. The tenor of the times also contributed to Mobil's inability to act with sufficient determination and imagination to remain independent.

There are two differing schools of thought as to how best to run natural resource operations: as free markets or cartels. In petroleum each has a principal spokesperson/theoretician – Paul Frankel, who has advocated control mechanisms which would ensure higher returns on production, processing and transport assets, and Murray Adelman of MIT, who preaches the benefits of unfettered markets. The prevailing orientation is Professor Adelman's. But when companies find they can't influence prices, and returns on investment suffer, they either have to become super big to enjoy the benefits of returns to scale, or very small in order to exploit niche markets. Those, like Mobil, who get caught in the middle, have the toughest time, and in this case no time left at all.

Sheep or lemmings?

Though the oil industry is jumping on the merger bandwagon, it is far from certain that this is the best course of action. Whenever the industry acts together like this, it often appears in hindsight not to have been the wisest move. When big oil (and chemicals) went prospecting on Wall Street in the 1970s, Texaco with Getty, Chevron with Gulf, Mobil with Superior, and DuPont with Conoco, they all bought at the top of the market. When they sold off their tanker fleets in the early to mid-1980s, private investors picked the vessels up for a song and in a couple of years made a packet.

DuPont's recent spin off of Conoco was well received by investors. The fact is though, that DuPont could have done better putting its money in the S&P 500 than into Conoco. And it relied on some very high-octane tax talent to make the partial divestiture profitable. Of course Wall Street loved both DuPont/Conoco deals, but Wall Street is not known to be discriminating and many, if not most, investment bankers have never met a deal they didn't like.

Conflict and culture

Despite initial investor enthusiasm, many mergers founder on the shoals of conflicting cultures. Worries that Mobil's combative feistiness and Exxon's relentlessly efficient stuffiness will prove a difficult to manage mix are somewhat overblown. The two companies are branches of the Standard Oil tree; they had offices at the same address in New York city after the break-up. Both companies successfully operated a joint venture, Stan Vac, in the Far East for many years without a hitch. Mobil people will toe the line. They'll have to or be forced to leave. Better to be culturally challenged than out on the street.

As for the bigger and better Exxon, it will be able to fashion a more balanced, integrated company now that it has Mobil's assets to play with. Beyond this, the merger really won't have much of an impact on the dynamics of the industry. Comparisons between Exxon Mobil and Saudi Aramco are somewhat wide of the mark. Saudi Aramco's marginal cost of finding new reserves is, relatively speaking, negligible. Exxon Mobil won't ever be able to match it, and neither will anyone else.

Good buy? Good friends, good bye

It remains to be seen how Exxon Mobil's stock fares, and also whether investor enthusiasm for the other oil merger deals – BP/Amoco, TOTAL/Fina and those purportedly in the works (Arco/Unocal?) waxes or wanes.

Other things to watch include how Exxon Mobil fares with the authorities, particularly the US Federal Trade Commission, and whether the new company will be more accommodating now toward the Clinton Administration's insistence on multiple east-west pipeline out of the Caspian region, a policy that the US petroleum industry strongly opposes.

It seems ironic that when the chips were down, Mobil had to rely on its competitor, Exxon, instead of its friend and partner, the Kingdom of Saudi Arabia, to pull its chestnuts out of the fire. Mobil Chairman, Lucio Noto, soon-to-be Exxon Mobil Vice-Chairman, seems to have played a weak hand well by cutting the best deal he could.

Keeping a tight hold on safety

ScanSense has developed BoltSafe in a bid to ensure that the correct bolt tightening and pre-tension are used in bolt joints. Incorrect tightening and pre-tension can lead to loose bolts and result in, for example, potential gas leaks and explosions. Used as a regular washer, BoltSafe measures the compressive force between the nut and its surface interface, ie the pre-tension in the bolt joint. The company claims that as the system eliminates the uncertainty of measuring pre-tension in bolt joints it can offer enhanced safety, dependable joints, better control and improved costs/benefit both during installation and throughout the joint's service life.

Based on amorphous sensor material (which is said to lend itself to small sizes, automated production and low costs), BoltSafe employs a small ASIC (application specific integrated circuit) in each unit which performs all signal conditioning, digital network connection and a selective identification number for each unit. The unit can communicate with PC or pro-

grammable logic controller (PLC) based equipment. The BoltSafe software has a built in 'report generator' which provides direct printed information of joint interface pre-tension while a log function presents graphs of pre-tension loss as a function of time. This means that the operator can take corrective action prior to the chance of any bolt failure occurring.

The system is available in two versions. The PMS (periodic measurement system) series makes pre-tension readings by docking a probe, from a handheld instrument, against the measurement spot on the washer. This excites the system inductively and modulates data back to the handheld unit. The CMS (continuous measurement system) allows any number of washers to be connected in a network with pre-tension readings made by a PC/PLC or other forms of control annunciation system.

Tel: +44 (0)181 408 5226
Fax: +44 (0)181 547 1569

Multi-function analyser for ASTM tests

The new Phase Technology Automatic Petroleum Analyser from Sartec is an ASTM approved instrument capable of measuring any combination of freeze, cloud and pour point. The unit is suitable for testing a wide range of petroleum

products, including aviation fuel, diesel and lubrication oils.

The compact unit incorporates a high performance solid-state cooler, eliminating the need for external cryogenic chillers. The analyser has a built-in LCD display that produces a graphical representation of each test and provides a multi-function interface for controlling the instrument. Test results can be printed on to a self-adhesive label printer and output digitally to laboratory information management systems (LIMS) or a remote PC.

Typical testing times are between five and ten minutes. A wide range of options and configurations are available to ensure the analyser can be matched exactly to the application; these include point function, sample introduction, heat removal method and external interface.

Tel: +44 (0)1732 884815
Fax: +44 (0)1732 885541



Corrosion control tool looks to the Millennium

Corrosion & Condition Control (C³) reports that its Amulet software system has been granted Millennium Products status by the UK Design Council. The Council was established last year following Prime Minister Tony Blair's challenge to business to show that the UK is the 'creative powerhouse of the world'.

The Microsoft Windows 95/NT based

software is designed for the effective management of corrosion monitoring and corrosion control methods. The system is said to help reduce chemicals, stores inventory and logistics costs, as well as lower inspection and chemical analysis costs.

Tel: +44 (0)1349 865554
Fax: +44 (0)1349 865558

Plantwide condition monitoring



The new MARLIN (machine reliability inspection) system unveiled by SKF Engineering Products combines both maintenance and process function monitoring in a lightweight, compact, portable package.

Designed to support total productive maintenance (TPM) objectives, the system is claimed to bring operations, maintenance, vibration analysis and reliability functions together enabling plant operations personnel to provide a broader appreciation and understanding of the efficiency, productivity and maintenance requirements of a plant.

'It also creates a means for important machine and process information to be utilised in real time,' explains the manufacturer, 'providing operations with the ability to collect, record and communicate both process and vibration data as part of a routine plant-wide inspection. As a result, personnel can spend less time on data collection and more time addressing problems and taking proactive steps to avoid machine and process stoppages while increasing root cause failure analysis efforts'.

SKF estimates that from the research it has carried out, companies that have implemented more advanced maintenance systems have, on average, achieved a return on investment of 11 times the programme cost. It found that maintenance costs have reduced by up to 27%, productivity gains have risen by up to 21%, unscheduled downtime has reduced by 40% and equipment breakdowns have reduced by 74%.

Tel: +44 (0)1582 496740
Fax: +44 (0)1582 496574

MMT fuel additive tackles valve seat recession

With leaded fuel due to be phased out across Europe from 1 January 2000 under the auspices of the Auto Oil I Directive, many companies have been looking at alternatives for vehicles with soft valve seats which are prone to valve seat recession (VSR). Two alternatives present themselves: (a) lead replacement gasoline (LRG) with a VSR protection additive already added and (b) an aftermarket additive in packaged form to be added to unleaded fuel.

Ethyl Corporation favours the first option and markets MMT (methylcyclopentadienyl manganese tricarbonyl), a manganese-based fuel additive. MMT is claimed to not only protect critical engine parts but also provide the octane gain which improves the performance of older vehicles.

The MMT fuel additive – that is recommended at a very low concentration of a few ppm – is also said to reduce emissions of carbon monoxide (CO), and of nitrogen oxide (NO_x) emissions from newer, catalyst equipped vehicles by, on average, around 20%. NO_x emissions are one of the main causes of urban smog and global warming. Nitrous oxide (NO₂) – a constituent of NO_x – has a global warming potential of 310 to 320 times that of carbon dioxide (CO₂).

The use of MMT has also been shown to protect such vehicles from engine oil phosphorous, a known catalyst poison, claims the company.

Use of MMT is also claimed to allow refiners to formulate cleaner burning fuels with lower driveability index, lower oxygenate content, lower Reid Vapour Pressure and lower aromatics levels. Furthermore, it claims that independent refinery studies indicate MMT could conserve tens of millions of barrels of crude, significantly lower refinery emissions (for example, potentially reducing CO₂ emissions in the US by nearly 1.8mn t/y) and save the global refining industry hundreds of millions of dollars per year in operating costs.

MMT is currently used in unleaded gasoline in Canada, the US, South America, Europe and Asia. In the US, it is marketed under the trade name HiTEC® 3000.

Adoption of the fuel additive has been opposed by some organisations, with claims that its use can adversely affect spark plugs and onboard diagnostic systems which could lead to high exhaust pipe emissions, and concerns over the potential increased risk of low level manganese exposure. Extensive, independent studies have shown such fears to be unfounded, claims the company. Ethyl has stated its intent to continue funding research and health studies associated with low level manganese exposure.

Tel: +32 27 15 22 11
Fax: +32 27 15 22 28

Sealed forecourt fuel deliveries

In a move to meet the requirements of the EC Directive on petrol vapour emissions from the use of dipsticks, due to enter force in January 2000, the Oil Products Division of Drum Engineering has developed a new sealed delivery system (SDS) for petroleum tankers. The system provides an electronic seal for individual tanker compartments, with sensors recording any movement of fuel between loading and discharge. A digital display on the API valve tells the operator that the full volume indicated on the carrier's loading ticket is being discharged. No dipping or opening of top-loading manlids are required.

Tel: +44 (0)1274 683131
Fax: +44 (0)1274 651006



Open path gas detection



Zellweger Analytics recently launched the new Sieger Searchline Excell infra-red Open Path Gas Detector System (OPGD) for hydrocarbon gases. Comprising a paired transmitter and receiver unit, the system is designed for use on offshore installations and in onshore hydrocarbon processing plants. In the event of gas release, the system initiates plant shut-down procedures in order to reduce explosion risk.

The detector monitors a hydrocarbon gas release or cloud as it passes through an invisible infra-red detection beam which operates over distances of between five to 200 metres. Such a system is said to offer a number of advantages over point gas detectors which rely on gas reaching a detector at one given point or location. Any change in the prevailing wind/air direction may take a gas away from a point gas detector which is also hampered by the fact that the further away it is from the source of the leak, the greater the degree of dilution until the concentration is below a detectable level.

A high intensity light source pulsed at a special coded frequency generates a strong infra-red beam enabling the OPGD system to penetrate further through fog and rain, states the company. In addition, carefully selected sample and reference wavelengths eliminate the problematic absorption of infra-red light by the O-H bond of water vapour.

Tel: +44 (0)1202 676161
Fax: +44 (0)1202 678011

If you would like your new product releases to be considered for our Technology News pages, please send the relevant information and pictures to:

Kim Jackson
Deputy Editor, *Petroleum Review*
61 New Cavendish Street, London W1M 8AR, UK

...continued from p21, Training – IP Courses

The Partners

For the new portfolio the IP has contracted arrangements with four partners

ENSPM Formation Industrie

ENSPM Formation Industrie has been providing continuous professional training for the oil and gas industry since 1975. The depth and quality of ENSPM Formation Industrie is enhanced by its affiliation within the Institut Français du Pétrole Group. This associates ENSPM Formation Industrie with one of the largest oil industry research centres in Europe and also links it to ENSPM (École Nationale Supérieure du Pétrole et des Moteurs), a distinguished French specialist oil and gas industry institute of higher education that offers postgraduate studies to doctorate level. More than 800 companies in over 80 countries have benefited over the last 20 years from ENSPM Formation Industrie's training services.

Invincible Energy

Invincible Energy is a training and consultancy company set up to meet the need for effective business risk management in the energy industry. It incorporates a fictional integrated energy company which has been delivering courses since 1983. In that year, the company designed and delivered the first course on International Oil Trading ever to be run in the world. Its Directors are assisted in delivering their events by a large number of practising industry experts.

Kennet Oil Logistics

Kennet Oil Logistics is a company specialising in providing consultancy to the oil industry worldwide in the area of supply trading and transportation. Project experience includes the analysis, development, negotiation and operation of oil trading and pricing arrangements, tanker chartering and shipping ventures, storage and terminalling agreements. Its Directors and Associates also have extensive experience in designing and running training courses in these sectors.

The Professional Development Institute of the University of North London

The Professional Development Institute of the University of North Texas is one of the world's leading organisations offering seminars, schools, conferences and in-house training programmes in oil and gas accounting, finance and taxation. PDI is the continuing professional education arm of the University of North Texas in Denton, Texas, USA. PDI has provided oil industry training seminars and conferences in the UK since 1978.

THE COLLEGE OF PETROLEUM AND ENERGY STUDIES



CPS
OXFORD ENGLAND

**International Oil Supply,
Transportation, Refining
and Trading (SP1)**

**22 – 26 March /
20 – 24 September 1999**

Introduction

This course covers an overview of the supply, trading, transportation and refining areas of the downstream. It is ideal for use as induction training for new entrants to the industry or those transferring disciplines.

Through the medium of a continuous theme case study, delegates will address day to day problems, and will understand the relevant commercial driving forces in this area.

Much of the work will be carried out in syndicate groups where teams will simulate real in-company practice, working with other delegates drawn from a wide background of disciplines in the industry.

Course Summary

After learning the fundamentals, delegates will cover the valuation of crude oil. Ocean tanker transport and freight will be explored together with a basic overview of terminals and pipelines. The structure of a refinery will be explained in the context of the need to produce marketable products. Aspects of product quality will be covered together with the key refining process needed to achieve them. The refining interface with petrochemicals, and retail/distribution will also be covered. The course moves on to cover oil markets and pricing and an introductory guide to paper markets and simple hedging.

For Further Information Contact:

Jenny Butterworth (please quote ref ECO10)
The College of Petroleum and Energy Studies
Sun Alliance House
New Inn Hall Street
Oxford OX1 2QD
United Kingdom

Tel: (+44) 1865 250521
Direct: (+44) 1865 260203
Fax: (+44) 1865 791474
e-mail: jenny@colpet.ac.uk
web: http://www.colpet.ac.uk

CS210055

**The Petroleum Review Index 1998 is
now available.**

Please write to
**Petroleum Review,
Institute of Petroleum,
61 New Cavendish Street,
London W1M 8AR, UK
for your free copy.**



THE INSTITUTE
OF PETROLEUM

Petroleum Measurement Manual Part XVII: Guide to Hydrocarbon Loss Accounting and Control in Petroleum refinery

A new subclause 7.7 dealing with processing losses has been added to Section 7 of PMM Part XVII. Two subjects are dealt with:

- a) Zero Value Products
- b) Nitrogen in FCCU Off Gas

Copies of this amendment are available free of charge from Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK.

Tel: +44 (0)1206 796 351. Fax: +44 (0)1206 799 331. e-mail: sales@portlandpress.co.uk

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

Amendment

Institute Awards



Bob Hooks (left) presents Dr Ian Roberts of BP's Oil Technology Network with the IP's Certificate of Appreciation for his contribution to the development and standardization of test methods. Ian is the Chairman of the IP's STG-2 Organic Analysis Panel – a post he has held since 1994. In addition to his IP work Ian is also involved in the development of a CEN standard for the determination of Aromatics in Diesel Fuel.



Richard Heins (right) presents Fred Edwards of Medlab with the IP's Certificate of Appreciation. Fred who worked for Shell Research until 1983 was chairman of the IP's ST-B-8 Stability of Light Distillates Panel from 1977 to 1997. He has played a leading role in the development of standards for the testing of aviation fuels and has been the project leader for a number of International Standards based on IP Test Methods.



Yorkshire Branch Chairman, Ivor Bennett (left) presents the Institute of Petroleum Student Prize to Andrew Carter at a seminar on Earth Sciences at Leeds University this month, for gaining a distinction in his MSC in Advanced Geophysics while at Durham University. Now at Leeds University doing a Phd, Andrew is specialising in Measurement of Anelastic Attenuation from surface seismic which if it works, will bring great benefit to the oil industry.

IP THE INSTITUTE OF PETROLEUM

New publication

A Risk-Based Approach to Hazardous Area Classification

60-page report presenting an approach applicable to classification of upstream and downstream petroleum facilities by consideration of the individual point source procedure in Chapter 5 of the *Area Classification code*. The intention is to use the content of this report in the present update of the *Area Classification code* and as a source of reference for the application of the risk-based approach.

ISBN 0 85293 238 3

25% discount to IP Members

Available for sale from Portland Press Ltd at a cost of £60.00 inc. postage in Europe (outside Europe add £5.00). Contact Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK.

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

Reserves Acquisitions

Michael R Smith (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 85334 607 1. 133 pages. Price: £350.

This handbook uses a number of case studies and other examples to provide a detailed analysis of the success factors governing reserve acquisition strategies. The publication offers practical advice on where to concentrate an organisation's resources to ensure that a coherent reserves acquisition strategy is in operation; a strategic blueprint uniting geoscientific, engineering, economic and commercial discipline; an overview of key elements that will effect a balance between technical and financial constraints and ultimate goals; and an appreciation of the types of strategic approaches that are available in different parts of the world and how they may be best exploited.

Energy On-line: A Guide to Internet Resources

Feico Houweling (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 84083 017 4. 126 pages. Price: £195 (\$312).

This publication examines the principal sources of energy information on the Internet and reviews specific sites in the nuclear, oil, gas and electricity sectors. It also provides details of specialised energy news and archives services that allow you to search for specific items within your field. Explanations of how to set up a website, install security measures and improve search techniques are also offered.

Hydrocarbon Exploration and Production*

Frank Jahn, Mark Cook and Mark Graham (Elsevier Science Limited, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK). ISBN 0 444 82883 4. 384 pages. Price (Hardback): \$138.

This book provides an introduction to the basic methods, concepts and technologies used through the major stages in the life of an oil or gas field – from exploration, through appraisal, development planning, production and, finally, decommissioning. Chapters are introduced by pointing out the commercial application of the subject in order to clarify its relevance to the overall business.

Oil & Gas in the Environment

(The Stationary Office, The Publications Centre, PO Box 276, London SW8 5DT). ISBN 11 310152 X. Price: £65.

One of a series of reports planned by the Environment Agency, this publication examines a range of key environmental issues. Using a whole life-cycle approach, it looks at the pressures on the environment from the exploration and production of oil and gas, right through to the disposal of used oil and oily wastes. While the impact of oil and gas on the environment has been reduced substantially through greater regulation and a greater awareness in industry, the report shows that the demand for oil and gas is maintaining and even increasing some pressures on the environment. Six areas of particular concern are highlighted in the report: climate change, air quality, inland pollution, marine pollution, decommissioning of offshore platforms and exploration in coastal waters.

European Oil Refining: Strategies for a Competitive Future

James MacDonald (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 85334 845 7. 156 pages. Price: £350.

This publication compares refinery operations in 23 European countries and profiles 15 of the industry's major companies in this sector. It reviews Western European pricing, demand and taxation and examines the restructuring trends in Central and Eastern Europe.

Cold Climate Corrosion – Special Topics

Editor: L D Perrigo (NACE International, PO Box 218340, Houston, TX 77218-8340, US). ISBN 1 57590 047 5. 150 pages. Price: \$75 (\$57 to NACE members).

This book provides an overview of the problems and issues affecting corrosion control in cold climates. It includes 12 papers from two NACE International conferences – Northern Topics Session of the 1996 Canadian Region Western Conference and the Denver Cold Climate Corrosion Symposium – which offer basic as well as applied information about what is involved in addressing specific problems in these geographical areas. Topics covered include the nature and extent of cold climate corrosion; cold climate corrosion control, including underwater maintenance and inspections, people and logistics, safety, shipping and storage, chemical selection and maintenance and servicing.

* Available on loan from the IP Library

Latest from the Library

New look library

During the summer of 1999 the IP Library at 61 New Cavendish Street will be refurbished.

The present shelving was erected in the early 1960s and can no longer cope with the format of the majority of today's published material. New shelving will be installed as part of the refurbishment programme.

The new design will enable more visitors to make use of our IT facilities. Individual table space will also be increased. One benefit is that visitors will be able to use their own laptops if they wish. There will also be extra facilities for visitors to access the Internet, *Reuter's Business Briefing* and the databases produced by the IP.

Needless to say we will have to close the library for visitor access during July and August 1999 for this work to go ahead. We will endeavour to keep this time as short as possible and will be giving definite dates nearer to the time. A skeleton service will be running throughout the period. You will still be able to reach us by e-mail, telephone and fax, and visit our website at www.petroileum.co.uk

LIS charges for 1999

You will be pleased to hear that we intend to keep all our charges the same for 1999. This means that if you visit the IP Library you will still be able to make photocopies for as little as 15 pence per sheet of A4.

IFEG

The AGM and IFEG Wine and Cheese Party were held on Thursday 10 December 1998. The party was kindly sponsored by RSAT International Limited and Bio Remidex Ltd.

EVENTS

Forthcoming

JANUARY

12-13 London

New Technologies in Offshore Oil and Gas in West Africa
Details: International Quality and Productivity Centre
Tel: +44 (0)171 430 7333
Fax: +44 (0)171 430 7303

14-15 London

Opportunities for Oil and Gas Development in the South Atlantic
Details: Spearhead Exhibitions, UK
Tel: +44 (0)181 949 9222
Fax: +44 (0)181 949 8186

14-15 London

Offshore Abandonment and Removal Conference
Details: Spearhead Exhibitions, UK
Tel: +44 (0)181 949 9222
Fax: +44 (0)181 949 8193

14-15 London

13th Annual Conference: Floating Production Systems
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858

14-15 Hungary

Hungarian Energy
Details: SMI Ltd, UK
Tel: +44 (0)171 252 2222
Fax: +44 (0)171 252 2272

18-19 London

E&P Data Management
Details: SMI Ltd
Tel: +44 (0)171 252 2222
Fax: (0)171 252 2272

26-27 Paris

Libyan Oil and Gas
Details: SMI Ltd, UK
Tel: +44 (0)171 252 2222
Fax: +44 (0)171 252 2272

27-28 London

Volatile Organic Compounds
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858

27-30 Zaragoza, Spain

PowerEXPO: International Exhibition and Congress on Energy and Power
Details: Alarcón & Harris, Spain
Tel: +34 91 459 93 59
Fax: +34 91 450 27 81

28 Paris

Panorama 99
Details: Sophie Dekeyser, Institut Français du Pétrole, France
Tel: +33 1 47 52 70 36
e-mail: sophie.dekeyser@ifp.fr

28-29 London

2nd Indian Oil & Gas Summit
Details: SMI Ltd, UK
Tel: +44 (0)171 252 2222
Fax: +44 (0)171 252 2272

28-29 London

Electronic Commerce for Oil and Gas
Details: First Conferences, UK
Tel: +44 (0)171 404 7722
Fax: +44 (0)171 404 7733

29 London

Negotiating & Structuring Profitable & Stable PSAs to Access New Hydrocarbon Frontiers
Details: Euroforum, UK
Tel: +44 (0)171 878 6886
Fax: +44 (0)171 878 6885

FEBRUARY

12-15 Berkshire, UK

Understanding Oil Supply Logistics
Details: Petroleum Economist, UK
Tel: +44 (0)171 831 5588
Fax: +44 (0)171 831 4567

15 February
London: International Conference on Financing the International Oil Industry - The Challenge of Major Projects
Details: Pauline Ashby, the Institute of Petroleum

15-16 Hamburg

Commercial Opportunities in Emissions Trading
Details: DMG Business Media, UK
Tel: +44 (0)1737 855380
Fax: +44 (0)1737 855283

16-17 London

Health Effects of Vehicle Emissions
Details: Energy Logistics International, UK
Tel: +44 (0)1628 671717
Fax: +44 (0)1628 671720

18 February
London: International Conference on The Caspian Region: The Major Oil and Gas Play for the Next Decade
Details: Pauline Ashby, the Institute of Petroleum

20-23 Bahrain

MEOS 99
Details: The Society of Petroleum Engineers
Tel: +44 (0) 171 487 4250
Fax: +44 (0) 171 487 4229

22-23 Aberdeen, UK

Best Practice Compliance with Environmental Regulations for Offshore Drilling
Details: Anita Bath, IIR Ltd, UK
Tel: +44 (0)171 915 5032
Fax: +44 (0)171 915 5000

23-24 London

Designing and Implementing an Effective Crisis Management Strategy
Details: Learning in Business, UK
Tel: +44 (0)181 944 4300
Fax: +44 (0)181 944 4311

25-26 Sydney

Australasian Energy Players
Details: Global Pacific & Partners, Australia
Tel: +61 2 9460 6771
Fax: +61 2 9460 6778
e-mail: glopac@ozemail.com.au

MARCH

1-2 Singapore

3rd Annual Asia Upstream
Details: Global Pacific & Partners, Australia
Tel: +61 2 9460 6771
Fax: +61 2 9460 6778
e-mail: glopac@ozemail.com.au

1-2 New York

Oil and Gas Investments in Re-Emerging Middle East Markets: Iran & Iraq
Details: CWC Associates, UK
Tel: +44 (0)171 704 6161
Fax: +44 (0)171 704 8440
e-mail: lwilliams@cwconferences.co.uk

1-4 London

Angola Energy Summit
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858
e-mail: cust.serv@ibcuk.co.uk

3-4 Miami

Oil and Gas in Latin America: The New Era
Details: CWC Associates, UK
Tel: +44 (0)171 704 6161
Fax: +44 (0)171 704 8440
e-mail: CW_Associate@compuserve.com

23-24 April London

CGES 9th Annual Congress: Investment Opportunities Under Low Oil Price Scenarios
Details: CGES
Tel: +44 (0)171 235 4334, or CW Associates
Tel: +44 (0)171 704 3176

Membership News

NEW MEMBERS

Mr A D Adekunle, Chevron Nigeria Ltd
 Mr R Al-Balushi, Oman Lng LLC
 Mr A A Al-Ahmadi, Saudi Aramco
 Ms M Al-Yacout, London
 Mr E Bayley, Newquay
 Mr D Bertocchi, Enron Europe Ltd
 Mr S A Betts, Norwich
 Mr M S M Birt, Stockton-on-Tees
 Mr J R Brough, Olenol Ltd
 Mr A Callum, P&O Trans European
 Mr H P Caruth, Bangor
 Mr S Clarke, Reading
 Ms E Corkhill, Aker Oil & Gas Technology UK plc
 Mr A P Costello, West Thurrock
 Ms G Davies, Walker Morris
 Mr C Dow, Little Clacton
 Ms F-R Findlay, London
 Mr S Fonteglla, ECOSA
 Ms J M Forbes, Anglo Siberian Oil Company plc
 Mr D Gardner, Kvaerner
 Mr R S Gill, Teddington
 Mr M A Hansen, Lowestoft
 Mr C M Howes, North Walsham
 Mr B C Hung, Australia
 Mr M Idahosa, London
 Mr M Jackson, Premier Oil plc
 Mr S Jarvin, Linklaters & Alliance
 Ms C I Kehoe, Herbert Smith
 Mr K Kesser, McDermott Marine Construction Ltd
 Ms J Lovett-Turner, London
 Mr J E MacDonald, Marketline International
 Mr M A Mailey, Stanford-le-Hope
 Mr A Martin, Koch Industries
 Mr S J McGowan, Manchester
 Mr B J McKellar, Gerald Eve
 Mr K McSorley, Londonderry
 Mr D Mireskandari, London
 Mr S S Paloumbis, Grace Davison
 Mr G R Potter, Chelmsford
 Mr J Roberts, Carratu International Group Ltd
 Mr M S Russell, Bury St Edmunds
 Mr R J Savell, East Dereham
 Mr R L Stewart, Bourne End
 Ms N Sinfield, Slough
 Mr C D Smith, Wiveliscombe
 Mr J G Soady, CGB Humbertherm Ltd
 Mr M A E Starr, Greenergy International Ltd
 Mr S P Sutherland, Mobil Oil Company Ltd
 Mr R G Taylor, Surbiton
 Mr R V Trist, EPPCO Ltd
 Mr H Van Elk, HKS Scrap Metals BV
 Mr G Vicary, Dyson Appliances Ltd
 Mr J C P Waithman, W D Loth & Co Ltd
 Mr C D Wall, ITS Caleb Brett
 Mr E G Westlake, London
 Mr J Zanetta, SGS Chile Ltd
 Mr T Zinder, Wm H Muller & Co GmbH

NEW STUDENTS

Mr O Akin, Centre for Petroleum Studies
 Ms A O Atimomo, Hornsey
 Mr A Bodunrin, Centre for Petroleum Studies
 Ms E M Brinck, London
 Mr W Brown, Leicester
 Ms M Bry, Centre for Petroleum Studies
 Ms D Commins, London
 Mr P Dobson, Manchester

Mr E Dos Santos, Centre for Petroleum Studies
 Ms S Dungkaew, London
 Ms S C Dunlop, Middlesex
 Mr R Gaisin, Dundee
 Mr G M Gibbons, Centre for Petroleum Studies
 Ms R Husari, London
 Mr A T Kazeem, Middlesex
 Ms J Kus, London
 Mr F J Lawrence, London
 Mr T D Legge, London
 Ms J MacDonald, Harrow
 Mr C Nabiye, London
 Mr C J R Wiltshire, London

STUDENT PRIZEWINNERS

Ms L Goual, Algeria
 Ms L James, Amerada Hess Ltd
 Mr S M Payne, LASMO plc

NEW FELLOW

Mr Simon J Shimmin F InstPet

Mr Shimmin graduated from Sussex University in 1971 with a BSc (Hons) in Mechanical Engineering Science. Since July 1997 Mr Shimmin has worked as an HSE adviser facilitating the implementation of a new HSE Policy and a more formal HSE Management System in the world-wide downstream operations of the Shell Group of companies. Prior to this, Mr Shimmin worked for 11 years in the London office of Shell's international aviation fuels business, most recently as Technical Manager for what is now Shell Aviation. Mr Shimmin was involved with IP committee activities throughout this period, becoming a member of what was then the Aviation Sub-Committee in 1986 and was its chairman from 1989. Additionally he was a founder member of the IP's Downstream Operations Committee until what is now the IP Aviation Committee became a full committee reporting direct to the IP Council. Although Mr Shimmin has not had any publications published in his own name, he has been directly involved in a number of IP publications including two editions of Part 7 of the IP Marketing Safety Code (Airports) and two editions for the IP's standard for Aviation Filter Monitors. He has also chaired three IP Aviation conferences.



The Aberdeen Branch of the Institute of Petroleum held its Annual Dinner at the Stakis Tree Tops Hotel, Aberdeen on 6 November 1998. The principal guest and speaker was Lord Simon of Highbury (formerly of BP – bottom row, second from left) now Minister for Trade and Competitiveness in Europe, and the second speaker was a retired sports journalist and well known after dinner speaker in Scotland – Mr Craigie Veitch. The other 'Top Table' guests comprised mainly of General Managers of the major oil companies in Aberdeen and the Lord Provost, Dr Margaret Farquhar, JP. The dinner was attended by over 450 people from the oil industry and related companies, mainly from the Aberdeen area.

IP Discussion Groups & Events

The Institute of Petroleum Discussion Groups have been combined to form
The IP Discussion Group: Energy Economics, Environment
The Group is chaired by Dr Roger Cairns, formerly Managing Director of Hardy Oil & Gas

London Branch

'The Baltic Exchange – Past, Present and Future'

Tuesday 19 January 1999, 17.30

Inge Mitchell, Lecturer, Associate Member, Baltic Exchange

'Exploration of the East Sakhalin Shelf'

Tuesday 19 January 1999, 17.30

Paul Nixon, Sakhalin Project Manager (G&G) Vice-President, Texaco Exploration Sakhalin Inc
Tea and biscuits will be served at 17.15. Light refreshments will be available afterwards.

IP Contact: Carol Reader on +44 (0)181 852 9168



THE INSTITUTE
OF PETROLEUM

New publication

Road Tank Vehicle Workshop Code

This new code gives guidance in the construction and equipping of workshops, and recommends safety procedures which should be observed during the repair and maintenance of road tanker vehicles used for the conveyance of petroleum products. It covers the following areas of concern: building standards; workshop electrical requirements; health, welfare and protection of personnel; workshop operations; cold work and hot work on vehicles; gas-freeing procedures; entry into and working on tanks; vehicle maintenance by outside contractors.

This new code should be regarded as a supplement to the IP's Model Code of Safe Practice Part 2: *Design, construction and operation of distribution installations* (ISBN 0 85293 204 9), published in September 1998.

ISBN 0 85293 191 3 25% discount to IP Members

Available for sale from Portland Press Ltd at a cost of £40.00 inc. postage in Europe (outside Europe add £5.00). Contact Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK.

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THE INSTITUTE
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IP Conferences and Exhibitions

IP Week 1999: London 15-18 February

See inside front cover for more details.

Places are limited and participants are advised to register early.

The IP Week programme and registration form is now available.

1999 Programme of Events

The Institute of Petroleum will again organise its European Retail Conference and specialist half-day Seminar in association with the 'Forecourt International and the Convenience Retailing Shows' at the NEC in Birmingham from 9-11 March. These events have rapidly become a well established forum for the discussion of current issues affecting retailing in the UK, continental Europe and the new rapidly developing markets to the East, and attract a high calibre audience of delegates and exhibitors from the UK, Europe and overseas.

IP International Seminar
The New Consumers – Growing Petrol Retail Markets in Russia, Central and Eastern Europe
NEC, Birmingham: 9 March

Organised in association with the

dti

Department of Trade and Industry

Irrespective of temporary setbacks in some markets, the countries of Central and Eastern Europe provide significant growth opportunities for private vehicles and the provision of petroleum products to fuel them. This Seminar will look at the development of petrol and associated retailing and the scope for supplies of retail equipment, goods and services across the region.

The IP European Retail Conference
The Profitable Forecourt
NEC, Birmingham: 10 March

This event will address the different strategies being adopted by major oil companies and other diverse players in the market to restore a sustainable level of profit from their European retail operations.

The programme and registration form is now available

1999 Programme of Events

Second International Conference on
Emerging Markets for Emissions Trading '99

London: 26-27 April

Sponsored by The United Nations Conference on Trade and Development (UNCTAD)

Supported by The Department of the Environment, Transport and the Regions

Course on Introduction to Oil Industry Operations

London: 16-18 June

and

Course on Introduction to Petroleum Economics

London: 21-23 June

The Institute of Petroleum is widely acknowledged within the oil and gas industry as the leading provider of introduction courses to the whole range of oil industry operations and economics.

The programme and registration form is now available.

International Conference on
Offshore Marine Support (OMS '99)
Southampton: 12-13 October

The Conference will discuss developments in the offshore oil industry and the opportunities and challenges they present to marine support contractors in the coming decade. For the first time in many years, it will present a unique opportunity for naval architects, yards and vessel owners to present their capabilities and new ideas to the oil industry.

Exhibition

An Exhibition of related equipment and services will be held in association with the Conference. To receive further information on stand availability, please contact the IP Conference Department.

The programme and registration will be available in April.

Programmes and registration forms for the above events are available from:

**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

or view the IP web page: www.petroleum.co.uk

MOVES

People

Malcolm Brinded has taken over as UK Country Chairman in addition to his role as Managing Director, Shell UK Exploration and Production (Shell Expro). **Chris Fay**, Chairman and Chief Executive of Shell UK Ltd since November 1993, will be retiring from Shell Group service in February, following a transition period supporting Malcolm Brinded in his appointment. In his 28-year career with the Shell Group, Fay has held numerous overseas posts and was Managing Director, Shell UK Exploration and Production for four years. Brinded began his career with Shell in 1974 in The Hague. He has held several senior engineering posts overseas and was seconded for two years to the UK Department of Energy as a policy advisor on international gas issues. He joined Shell Expro in 1993 as General Manager, Northern Fields and was appointed Managing Director of Shell Expro in July this year.

The Board of Directors of TOTAL Fina, the new company formed by the merger of TOTAL and Petrofina, will be expanded to include four new Directors. Next to **Thierry Desmarest**, Chairman of the Board, **Albert Frère** and **Jean Syrota** (currently member of the Board) will be named Vice-Chairmen to the Board. **François Cornélis**, CEO of Petrofina, will become Vice-Chairman of TOTAL Fina's Executive Committee, over which Thierry Desmarest will preside.

L R Raymond will be the Chairman, Chief Executive Officer and President of Exxon Mobil Corporation, the new company formed by the merger of Exxon and Mobil. **L A Noto** will join the Exxon Mobil Board of Directors as Vice-Chairman, and **E A Renna** will join as Senior Vice-President and Director. Four additional members of Mobil's Board will be invited to join the Exxon Mobil Board as Non-Employee Directors, bringing Board membership for the company to a total of 19 Directors.

Chevron has announced that **Dave O'Reilly**, President of Chevron Products Co and a Corporate Vice-President, has been elected a Vice-Chairman and Member of the Corporation's Board of Directors. **Patricia Woertz**, a Vice-President of Chevron Products Co, has been elected President of the products company and a Corporate Vice-President.

Dr Istvan Halasz has joined Zeolist International as a Senior Chemist, and will be based at the company's Pennsylvania-based R&D facility. Dr Halasz's experience includes synthesis and testing of zeolite catalysts for hydro-dewaxing of diesel fuels, fluid catalytic cracking, vehicle emission control, and olefin isomerisation.



Ramco has appointed **Phillip E Maxwell** as President, Muradkhanli Operating Company (MOC). Maxwell has more than 24 years' experience in the oil industry. He joined Ramco from the Caspian International Petroleum Company in Azerbaijan, where he had been seconded by Pennzoil in 1996 as the CIPCO President's Assistant and Partner Liaison Manager. Prior to joining Pennzoil he was with BP where he established the company's first office in Azerbaijan.

David McLean Group has made a number of changes to its Board of Directors. Former Group Financial Director **Jim Thompson** is now Chief Executive. Thompson is replaced as Group Financial Director by **John Kendrick**.

Kevin Taylor has been appointed Director of a new commercial unit which brings together Whessoe Vares's oil and gas tank gauging instrumentation and SCADA systems integration products and services. Taylor joined the company in 1992 as Proposals Manager, and progressed to Systems Manager in 1994.



John Morgan has become a Non-Executive Director on the Wood Group board. He retired from BP last year after 30 years with the company. Over the last year Morgan has been a Consultant to the Wood Group with a focus on strategy development, and he will continue to maintain a special interest in this area following his new appointment.

Coplex has announced that **Dale Berry** and **Joe Naemi** have joined the company's Board of Directors. **Peter Tapper**, **Ray Friend**, **David McDonald** and **Bill Richardson** have stepped down from their positions on the Board. However, McDonald continues as Chairman of Petrolex, and Friend as a Director of the Petrolex Board.

Pipeline Integrity International (PII) has appointed **Paul Clayton** as Sales Engineer for PII Kershaw Ltd. Clayton joined the company in 1991 as a Field Engineer, and has gained much experience during his seven years with the company.



David Michael Spratt has been named Operations Director for ICF Kaiser's Asia-Pacific Region. Spratt has more than 30 years' experience in mineral processing and mining engineering. He previously served as Chief Operating Officer of Minproc Ltd, and prior to that as Managing Director and Chief Executive Officer of Simcoa Operations Pty Ltd.

The Board of Tuskar Resources has appointed **Sir Derek Alun-Jones** and **Sunil Pathak** as Non-Executive Directors. Alun-Jones was previously a Director of Burmah Oil Trading and Chief Executive of Ferranti International. He is currently a Non-Executive Director on the Boards of Straker Holdings and Astro Technology Systems. Pathak is Managing Director of Reliance Trade Corporation.

Christian Pauchon has become a Director of the Applied Mechanics division of IFP. He succeeds **Alain Bamberger**, who is moving on to other responsibilities at the IFP School.

A number of key individuals from the energy team at Robert Fleming & Co have agreed to join the Global Energy Group of BT Alex Brown International, the international investment banking division of Bankers Trust International plc. **Rob Gray**, Head of the Energy Group at Flemings, will join as Managing Director and Head of the Global Energy Group. **Jon Newbon** will be appointed a Director of the company, and **Rupert Newall** will be appointed a Vice-President.

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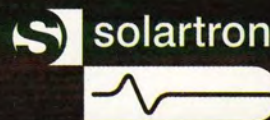


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