Petroleum review

OCTOBER 1999

Gas

- Gas dynamic sweeps across Europe
- Taiwan boosts LNG imports

North Sea

Decommissioning projects in the offing

Aviation fuels

Trends in UK jet fuel quality

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

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Training Courses 1999

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organised in association with Invincible Energy

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Professional Development Institute
University of North Texas

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and

United States SEC and FASB Accounting and Reporting for Petroleum Companies (SEC)

organised in association with the Professional Development Institute, University of North Texas

London: 3–4 November 1999

This 2-day Course is designed to provide an understanding of current United States SEC and FASB accounting and reporting requirements for oil and gas producing companies, including the details of requirements for enterprises using the successful-efforts method and the full-costing method.

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For a copy of the programme and registration form for any of the above Courses, contact:
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ABBREVIATIONS

The following are used throughout *Petroleum Review*:

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

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

Front cover: City gas storage in Taiwan. Rapidly increasing LNG imports supply both domestic and power generation markets

Photos: Courtesy of David Hayes

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The race to e-procurement

It is hardly a secret that virtually all oil and gas companies are looking at how e-commerce and the Internet can reduce their operating costs and improve efficiency. Task forces, working groups and special projects abound. There are even rumours of ambitious target dates in the race for the glittering prize – paperless, electronic procurement.

Now the race to e-procurement appears to have started in earnest, with the announcement that Statoil is seeking to gain market advantage by lowering procurement costs through the use of the new SAP Business to Business™ (SAP B2B™) web-based procurement system from SAP, the business software solutions company. The announcement was made at the recent Offshore Europe '99 show in Aberdeen but its significance appears to have got lost amid a welter of UK Government initiatives, the demise of CRINE and the birth of LOGIC (see p3).

According to SAP, by using the new system 18,000 Statoil employees will have direct access to web-based catalogues from which they can select the products that best satisfy their needs. The system is claimed to facilitate the processes associated with the procurement of indirect materials, including maintenance, repair and overhaul (MRO) goods as well as services. The system is said to encompass all processes, from the creation of purchase requisition, with or without electronic catalogues, to the remittance of an invoice.

Although Statoil has a fair claim to be the first oil company to announce the move to e-procurement, Enron has one of the best claims to be the oil and gas industry pioneer – it already makes considerable use of the Internet for procurement.

The other, and inter-linked, announcement made at the Aberdeen show was the launch by SAP of its mySAP.com™ website. [This can be viewed directly at **www.mysap.com** or accessed via the hot-link on the IP website at **www.petroleum.co.uk**] The new site is described as 'an open Internet-based business-to-business hub providing content, community, collaboration and commerce'.

It is claimed that the website will combine industry-specific functionality with Internet technology to provide a tailored collaborative e-business solution for oil and gas companies.

Petroleum Review was told by Dieter Rafalsky, Vice President of the Oil and Gas industry business unit at SAP AG, that the company was launching marketplace solutions for 26 market areas within the mySAP.com environment. These solutions will allow suppliers to sell into a range of end markets, making the commitment to this type of trading environment more attractive to smaller suppliers who may have only a limited presence in any one industry. He noted that, in addition to Statoil's commitment, Enron is also to use the SAP marketplace and is currently negotiating with up to 1,000 companies operating or planning to operate in this new environment. He also claimed great confidence that BP Amoco would probably be the next company to move to e-procurement.

He explained that, although the primary drive is coming from the buyers, the situation is now changing. Suppliers are taking an increasing interest and many of the smaller companies are expressing the hope that reduced transaction costs will give them easier access if buyers move away from preferred supplier lists. The ability to hedge readily across segments and sectors is also seen as helpful to the smaller supplier. According to Rafalsky, the move to e-procurement is happening much faster than most people expected. Security concerns have largely been addressed although the legal side is 'a problem'. The other key challenge are the organisational and cultural changes necessary to capitalise on e-procurement. Despite these caveats he had no doubts that the race to e-procurement in the oil and gas industry has now started in earnest.

Cost savings

Earlier this year the world's largest and most profitable company – General Electric (GE) – set every company boardroom on edge with the news that it had saved $1bn/y in procurement costs by moving to e-procurement. As all procurement expenditures are business costs, any savings go straight to the bottom line. No one had suggested that GE's procurement system was inefficient before the change so it gives a measure of just how large the e-procurement prize is, even for already efficient companies.

At GE there have been quite profound changes in the relationship with suppliers in pursuit of paperless e-procurement. Suppliers have had to make significant IT commitments, while GE has had to reveal more internal information to suppliers than ever before. The number of suppliers has reduced because not all saw it as in their interest to make the necessary changes and commitments. The whole business relationship has become less adversarial and more cooperative. In many senses this is directly analogous to the oil industry's move to alliances for field developments.

Security and secrecy

The resistance to a rapid move to e-procurement usually comes down to two areas of concern – security and secrecy. There are and continue to be legitimate concerns about the security of electronic networks, particularly for financial transactions. The recent rapid move by the Banks into Internet operations strongly suggests that these problems have been satisfactorily solved. To date the Internet has been a largely law and lawyer-free zone. Clearly, this is about to change although there are cynics who suggest it is not obvious which is the more expensive the absence of law or the presence of lawyers.

The other area that appears of great concern to the oil industry is secrecy. Most industries have been a little paranoid about the Internet. Only the oil industry has spent quite so much money building intranets few are allowed to dial out of or e-mail systems that cannot be dialled into or ones that are routed via security servers on the far side of the planet.

The world's first 'network' was the telephone. There is not much productivity gain with just an internal phone network. The major gain comes when the staff inside are connected to the world outside. The Internet in all its many forms offers truly amazing gains – but only when the inside is connected to the outside. The race to e-procurement is the start to one of the most momentous changes ever to hit the oil and gas industry.

Hello and goodbye

We are sorry to report that Catherine Pope, who did so much to develop our website, is leaving us to work in the City. We give her our best wishes for the future. We are pleased to be able to report that Perry Hackshaw has already joined to take over the position of Webmaster. Perry will continue to develop and expand the website, including the new Members Only area. He can be contacted on Tel: +44 (0)171 467 7112 or e:**phackshaw@petroleum.co.uk**

NEWS Upstream

New initiatives to boost UK North Sea output

UK Energy Minister Helen Liddell announced at Offshore Europe in Aberdeen last month that the Oil and Gas Industry Task Force is to focus on driving forward new technologies and industry collaboration targeted on marginal North Sea fields via a new Industry Technology Facilitator (ITF).

It is hoped that the ITF initiative will give the industry the potential to win up to 5.6bn barrels of additional oil for the UK in the next five years. Liddell said: 'The history of the UK's oil and gas success over the last 30 years is about technological innovation. This new organisation will build on that success by identifying needs, developing products and getting them adopted.'

As part of the drive to unlock the future output from the North Sea, the Oil and Gas Industry Task Force has also launched a new LOGIC (Leading Oil and Gas Industry Competitiveness) initiative. 'LOGIC is the most important initiative to come out of the Task Force since it will help industry to help itself meet the challenge of its international competitiveness,' said Liddell. The UK Department of Trade and Industry (DTI) is to commit £1.6mn funding to start up LOGIC. Additional funding will be provided by the UK Offshore Operators Association (UKOOA), Offshore Contractors Association (OCA), International Association of Drilling Contractors (IADC), Energy Industries Council (EIC) and the International Marine Contractors Association (IMCA).

Based in Aberdeen, LOGIC will be operational from January 2000 and will provide professional counselling services to the industry on best practice, encourage collaborative initiatives, and facilitate training and information sharing. It will also take over the supply chain activities of CRINE, which will be disbanded by the end of 1999.

The LOGIC initiative is expected to deliver a £1bn improvement in performance in the North Sea over the next three years. It is also hoped that by improving competitiveness, UK suppliers and contractors will be able to more effectively work towards the Task Force's target of increasing UK suppliers' exports by 50% over the next five to seven years, boosting UK business by some £2bn.

Liddell also announced the development of a 'virtual corporation' aimed at helping small companies who specialise in understanding geological formations for oil and gas exploration. The UK Oil and Gas Geoscience Network will help companies compete for world business more effectively by working together.

Major order for AUVs

Aberdeen-based marine technology specialist Konsberg Simrad has secured a major international order for its new generation of autonomous underwater vehicles (AUVs) – the HUGIN 3000 – from US-based hydrographic surveying company C&C Technologies.

Developed in the North Sea, the HUGIN 3000 is powered by an aluminium oxygen fuel cell battery with a life of 48 hours and can operate at depths of 3,000 metres.

It is integrated with a wide range of survey sensors, including the EM2000 multibeam echo sounder for swath bathymetry and imagery, chirp side scan sonar and sub-bottom profiler and a caesium magnetometer. It is also equipped with an underwater positioning system and acoustic control and data reading links.

The vehicle is the new third-generation of craft developed in partnership with Statoil, the Norwegian Defence Research Establishment (FFI) and Norwegian Underwater Intervention (NUI).

Norwegian blocks on offer

The Norwegian government is offering a total of 48 blocks or part blocks in the country's 16th offshore licensing round. The acreage on offer includes deepwater blocks in the largely uncharted Voring and More deepwater basins, as well as the shallower water areas in the Donbanken and Haltenbanken areas.

The licensing round will close on 31 January 2000.

Buckland onstream

Mobil's Buckland field in the northern North Sea has come onstream. Initial production is 16,000 b/d of oil and is expected to rise to 30,000 b/d shortly. Located in block 9/18, the field has been developed as a subsea satellite tied back to the existing Beryl Alpha production platform in block 9/13. Associated gas of 40mn cf/d will be comingled with Beryl gas and exported via the Mobil-operated SAGE pipeline to St Fergus in Scotland.

Field partners are: Mobil (35%), Repsol (33.3%), Enterprise Oil (14.4%), Amerada Hess (14.1%) and OMV (3.2%).

In Brief

United Kingdom

Talisman Energy's Orion field in the UK *central North Sea has come onstream. Initial production through Talisman's Clyde platform reached 7,000 b/d of oil and 16mn cf/d of gas.*

Burlington Resources' Millom and *Dalton gas fields in the East Irish Sea have come onstream. Initial production from three wells, which are tied back to the Hydrocarbon Resources-operated North Morecambe platform, is in excess of 100mn cf/d.*

Veba Oil & Gas UK, operator of North Sea *block 21/24, has announced that hydrocarbons have been found in the Clapham structure, located 8.5km northwest of the Guillemot West field. The 21/24-6 discovery well tested at 5,894 b/d.*

Human Resources Consultancy Norman *Broadbent is to play a key role in the management of the Nova Technology Fund's Business Mentor Programme, part of an initiative to develop the capability of the UK oil industry, launched by CRINE earlier this year. The Aberdeen-based Oil & Gas Division of the company will recruit and maintain a database of technical professionals and coordinate the provision of their operational and commercial expertise to small and medium enterprises (SMEs).*

Conoco has announced a natural gas *discovery on the E-Plus prospect on block 49/17 in the North Sea. No further details are available.*

Europe

Cost overruns on Statoil's Åsgard field *in the North Sea are reported to have reached NKr10bn. The Åsgard B semi-submersible gas platform is understood to account for much of the recent cost overrun, although drilling costs also are reported to have risen.*

BJ Services Company reports that it has *set a new record in deepwater cementing in Norwegian waters. The record was set with* Scarabeo 5, *drilling for Saga Petroleum on its deepwater licence at the Gjaller ridge north of the Norne-field in the Norwegian Sea.*

Norsk Hydro has awarded Transocean *Offshore an 18-month, $63mn contract for its semi-submersible rig* Polar Pioneer *to drill in the North Sea Troll oil and gas field.*

UK oil and gas output reaches new highs

UK production of both oil and gas reached their highest ever July levels this year, and average daily production in the 12 months to July was at its highest ever level for gas, according to the latest edition of the Royal Bank of Scotland's *Oil and Gas Index*.

'If output continues on this trend for the rest of the year, 1999 will see UK oil and gas production reach new peaks,' commented Stephen Boyle, Head of Business Economics.

Revenue figures were also up as the recent rise in oil prices took effect. Oil revenues were £31.3mn/d in July, up 31% on the month and up 75.2% on the year. According to Boyle, the strong revenue growth 'partly reflects rising production, but it is mainly down to the increase in oil prices of almost 57% in US dollar terms and almost 64% in sterling terms compared with July last year'.

Oil prices reached an average of $18.9 in July, breaching the $21 level in August and September. The success of the Opec production cuts continues to be a factor, together with stronger demand in East Asia.

On an annual basis, oil production was up by 7%, but more significantly, average daily output in the 12 months to July was the highest for any 12 months since the year to October 1986. Gas output was up by 18.9% on the year.

Year Month	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price ($/b)
Jul	2,432,040	5,733	12.06
Aug	2,379,644	5,640	12.05
Sep	2,573,882	6,394	13.28
Oct	2,600,813	8,832	12.60
Nov	2,612,843	10,738	11.07
Dec	2,715,056	11,123	9.81
Jan 1999	2,664,121	11,532	11.16
Feb	2,678,138	11,532	10.20
Mar	2,679,786	11,107	12.54
Apr	2,717,767	9,863	15.66
May	2,507,093	7,349	15.18
Jun	2,400,277	6,785	15.91
Jul	2,602,363	6,816	18.90

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

R&D funding tackles North Sea drill cuttings

The UK Offshore Operators Association's (UKOOA) Drill Cuttings Initiative has announced the award of 15 research and development (R&D) contracts as part of a £1mn spend in the first phase of its investigations into options for dealing with accumulations of drill cuttings beneath oil and gas installations in the North Sea.

The R&D programme will be monitored and the final reports reviewed by a newly created independent scientific review group established to ensure the transparency and integrity of research findings on behalf of stakeholders. The group is chaired by Professor John Shepherd, the former Director of Southampton Oceanography Centre and currently Director of the Earth System Modelling Initiative. Its members, drawn from a field of eminent academics, reviewed the shortlist of proposals submitted under competitive tender and contributed to the final selection of the R&D companies.

The industry initiative, launched in June 1998, combines scientific research and development with public consultation to identify the best environmental practice and best available techniques for dealing with drill cuttings that have accumulated on the sea bed – the legacy of early offshore oil and gas activity.

Eric Faulds, Chairman of the UKOOA Drill Cuttings Initiative, said: 'Possible options include complete removal, in situ treatment or leaving the accumulations undisturbed. The environmental impacts of these options, as well as the technologies required, are the subject of this current programme of study'.

In Brief

Coflexip Stena Offshore is reported to *be spending $30mn on upgrading the* CSO Constructor *to enable her to lay rigid and flexible pipe in deep water.*

Norsk Hydro has awarded Kvaerner *the pre-engineering contract on the North Sea Grane field. The contract, worth NKr70mn, will be based on a development and operation plan scheduled to end July 2000.*

Two wells on Statoil's Statfjord north *flank development of the North Sea flowed first oil at the end of August. The north flank has estimated recoverable reserves of 75mn barrels. Output is forecast to be 25,000 b/d.*

Wood-Stork – the new joint venture *between Aberdeen-based Wood Group Engineering and Dutch company Stork ICM – has secured a five-year integrated services contract worth £65mn covering all of NAM's offshore production facilities in the Dutch sector of the North Sea and the gas treatment facility at Den Helder in the Netherlands.*

North America

The Canadian government is understood *to be planning to sell its 8.5% interest, worth at least C$400mn, in the Newfoundland Hibernia field. It may also dispose of its remaining 18% interest in PetroCanada which has been valued at C$1.2bn.*

BP Amoco has signed an agreement to *market Nova Scotia's 45mn cf/d share of gas production from the Sable Offshore Energy Project.*

Chevron has reached a definitive agreement *with The Chandler Company to transfer its oil and gas assets in Utah's Uinta basin to Shenandoah Energy Inc, a new company recently formed by Chandler. In exchange for its assets, Chevron will receive an equity ownership interest in Shenandoah and an undisclosed amount of cash.*

Arco and Anadarko are understood to *have revised their development plan for the Alpine oil field in Alaska in order to boost planned production from 70,000 b/d to 80,000 b/d by 2001. The field is due onstream mid-2000 at an initial rate of 40,000 b/d. A total of 112 horizontal wells are to be drilled, up from the 94 originally planned. Enhanced oil recovery will be used from field start-up.*

UKCS – maturing gracefully

Wood Mackenzie has completed its annual review of the near-term future oil and gas developments on the UK Continental Shelf (UKCS).

In its latest *UK Upstream Report*, the consultancy has analysed the 1999 portfolio of probable fields and their impact on the future of the UK upstream industry. The main points to emerge are:

- A total of 35 proposed projects, which account for 38 fields, have been earmarked for development within the next two to five years. This represents a 22% decrease on the 45 fields that were proposed for near-term development in the 1998 probables portfolio.
- Since publication of Wood Mackenzie's probable developments, a total of nine fields have gained development approval, accounting for some 253mn boe.
- Only two new developments, which include four fields, appear for the first time in the 1999 portfolio. The Goldeneye and Easington Catchment Area Phase II projects account for some 191mn boe or 11% of the combined 1999 probables portfolio reserves.
- The total 1999 probables portfolio accounts for some 1.7bn boe, of which 860mn barrels are liquids, and 4.8tn cf is gas. This represents a 32% decrease on the 1998 recoverable reserves figure of 2.5bn boe.
- Peak liquids output from the 1999 probables portfolio is not anticipated until 2004 and will account for 286,000 b/d, around 14% of total liquids production at that time. Peak gas output from the portfolio is anticipated also to peak in 2004 at some 1,600mn cf/d – representing approximately 16% of the total gas production forecast for that year.
- Of the 35 proposed near-term projects, the majority – some 17 fields – are expected to utilise subsea technology tied back to existing infrastructure. Also of significance is that for the first time in five years no near-term development contenders are likely to utilise floating production technology.
- The forecast capital expenditure in nominal terms for the 1999 probable developments amounts to around £4.1bn. This figure is some 39% lower than the corresponding figure of £6.7bn that was estimated for the 1998 portfolio.

Further to Wood Mackenzie's review of the portfolio itself, it has also assessed the impact of 1999 probable developments in the context of the overall future prospectivity of the UKCS. It has assessed the quality of existing potential additional reserves (technical reserves) together with the impact of brown field growth and reserves creep on existing fields as well as the envisaged potential of exploration through the 'yet to find' reserves criteria.

The review highlights a shift away from exploration and toward the sustainability of current developments. Frontier regions aside, any requirement for additional discoveries in core areas of the UKCS will depend increasingly on commercial constraints (finding and development costs and operating efficiencies) as well as the availability of infrastructure.

However, there exists a significant reserves base to be exploited through this area of development activity. Indeed, near field or near facilities potential (NFP) and brown field development may well replace the probable developments as a focus for future reserves replacement efforts. Consequently, prospectivity indicators such as the total contribution of the probable developments portfolio and the level of exploration and appraisal activity should not be viewed in isolation.

In addition to maximising the return from core interests in the UK by exploiting NFP and reserves creep on existing assets (for example, through the use of advanced drilling techniques), active portfolio management can equally assist in creating operating efficiencies. Indeed, recent industry consolidation has focused on cost savings through a combination of assets in core areas and the realisation of the synergies that an enlarged portfolio can offer.

However, in order to improve the sector's competitiveness so that the North Sea can continue to attract future investment and sustain future production, attention must be focused on reducing the high cost base of the UKCS.

To this end, the Government and industry established the joint Oil and Gas Industry Task Force (OGITF) at the end of 1998 to encourage UK upstream activity in the longer term but also to improve its competitiveness within the global market.

In Brief

Agip is reported to have acquired 34% *and 32% interests in the Gulf of Mexico Macaroni and Europa fields, respectively, from Shell for an undisclosed sum.*

Columbia Natural Resources has *acquired a 50% working interest in New Brunswick provincial exploration licences and a 50% stake in the Downey #1 discovery well in New Brunswick from MariCo Oil and Gas. It has also formed a 50:50 joint venture with Corridor Resources which will undertake a multi-well exploration programme on licences currently held by Corridor in the Sackville and Elgin Basins in southeastern New Brunswick.*

R&B Falcon has secured $250mn *financing for the construction of its ultra-deepwater semi-submersible rig* – Deepwater Nautilus – *which is being built at Hyundai Heavy Industries in South Korea and is due to be delivered in December 1999. The rig is due to start a five-year contract with Shell in the Gulf of Mexico in 1Q2000.*

Elf Exploration's Matterhorn well in *Mississippi Canyon block 243 in the Gulf of Mexico has tested at 6,640 b/d of oil, together with some associated gas.*

TotalFina reports that the MC348-1 *discovery well on Mississippi Canyon block 348 in the Gulf of Mexico has encountered gas. No further details are available.*

Russia & Central Asia

Conoco reported in August that it had *failed to agree terms with Azeri state oil company Socar on rehabilitating the shallow water Gunashli field – which is estimated to hold over 1bn barrels of recoverable oil reserves – within the timescale set by an agreement signed in December 1997. It is not known if Conoco is seeking an extension to the deadline or if it plans to pull out of talks.*

Asia-Pacific

PT Caltex Pacific Indonesia is reported *to have brought the Piala oil field in Bengkali, Riau, onstream at an initial rate of 2,000 b/d.*

The Trat field operated by Unocal in *the Gulf of Thailand has started producing natural gas at a rate of 70mn cf/d and 2,100 b/d of condensate.*

Banff production reaches 5mn barrel marker

Conoco and PGS Atlantic Power announced in mid-September that the Banff field in the UK sector of the North Sea had produced 5mn barrels of crude oil under the Phase II of the project which began just eight months earlier. The field is currently producing more than 50,000 b/d of oil and 30mn cf/d of natural gas from two wells. It is approaching its planned peak production levels of 60,000 b/d of oil and 40mn cf/d of gas.

The project is said to be the first to be developed using a Ramform-shape floating production, storage and off-take (FPSO) vessel. The wedge-shaped hull and wide stern of the Ramform Banff enable it to carry large deck loads without compromising stability or safety. Moored by a fully weathervaning turret system, designed to keep the vessel stationary in 100-year storm conditions, the vessel has storage capacity for some 120,000 barrels of crude oil protected by a double hull. Oil is transported to market via two shuttle tankers and gas is exported into the Central Area Transmission System (CATS). Field life is expected to be eight years and the development includes provision for additional production from adjacent areas.

According to Conoco's Banff Unit Manager, Lloyd Cowlam, the field represents 'a good example of how smaller fields can be developed and operated safely, efficiently and cost effectively by using innovative technology and business practices'.

Field partners are: Conoco (31.7%), Ranger Oil (26.2%), Enterprise Oil (27.9%), British-Borneo (12.4%) and Petrobras North Sea (1.8%).

Timor Gap Treaty under threat

The survival of the Timor Gap Treaty between Australia and Indonesia is now in doubt and may be cancelled by the events following East Timor's vote for independence last month.

It was assumed by companies operating in the Timor Gap that East Timor would take over Indonesia's role in the treaty which sets out revenue sharing and taxation arrangements between the petroleum companies and governments involved.

The immediate implication is delay to the approval of the Bayu-Undan liquids project worth A$2.7bn, said energy company Petroz after Indonesia's Mines and Energy Minister, Kuntoro Mangkusubroto, said the treaty was likely to be cancelled.

***The Thai government is reported to** have approved a joint venture with Malaysia to build a $1bn, 220-mile gas pipeline linking the Joint Development Area in the Gulf of Thailand to shore in the Songkhla province in southern Thailand. Construction of the pipeline is due to begin in 2001.*

***A new gas field has been discovered** in Vietnam's Hanoi basin by Australia-based Anzoil. To fund development the company plans to sell 15% of its 75% stake in the production sharing contract to Maurel & Prom.*

***Unocal's Pailin field in the Gulf of** Thailand is reported to have come onstream. Production is expected to reach 165mn cf/d in 4Q1999. A second phase of development is due onstream in mid-2002, adding a further 165mn cf/d production.*

***OMV (33.3%), Agip (33.33%) and IB** Resources (33.33%) have been granted exploration permit WA-292-P in the Beagle Sub-basin on the Northwest Shelf of Australia. It is the first exploration permit awarded to OMV in Australia, a country in which the company plans to develop a core oil exploration and production business.*

***India's latest licensing round is reported** to have attracted 45 bids from 10 foreign companies, six private Indian companies and five state-run operations for 27 oil exploration blocks. A total of 10 of the blocks bid for lie onshore the country, 26 in shallow water and 12 in water depths more than 400 metres. A total of 21 blocks attracted no bids.*

***Shell is reported to have made an oil** discovery in the Sanchor Basin in western India. The Guda-II well is understood to have flowed at 2,000 b/d of light crude. The find is said to be the first to have been announced in India by a foreign firm since the country opened exploration to multinational bidders.*

Latin America

***Enterprise Oil, Petrobras, Elf and Shell** are to form a new joint venture to explore for hydrocarbons in block BC-2 in the deep waters of Brazil's Campos Basin.*

In Brief

***Mallon Resources of Denver is reported** to be planning to drill up to 250 new wells in the San Juan Basin of New Mexico where recoverable reserves have been put at more than 300bn cf.*

***Repsol-YPF and Sipetrol Argentina** have discovered a new field on the CAM 2/A South block on the Argentine continental shelf. The first exploratory well tested at 15mn cf/d of natural gas and 15 b/d of condensate while a second flowed at 2,000 b/d of oil and 620,500 cf/d of gas.*

***Emerald Energy is understood to have** made a 200mn barrel oil discovery in Colombia after an extended well test on the Gigante field flowed 3,500 boe/d including 2.2mn cf/d of gas.*

***TotalFina has acquired a 15% stake in** a joint venture exploring the deepwaters offshore Suriname. The other consortium partners are Burlington Resources (35%), Shell (35%) and Korea National Oil Corporation (15%).*

***Harken Energy (80%) and MKJ** Exploration (20%) have secured an exploration concession covering blocks 2, 3, 4 and 12 on the North and South Limon Back Arc Basin on- and offshore Costa Rica. Up to $2.9mn is to be invested on initial work in the acreage.*

Africa

***Elf Aquitaine is to acquire 40% of** Arco's interest in the Rhourde El Baguel field in Algeria for an undisclosed sum. Arco will retain a 60% share in the field which is estimated to hold 3bn barrels of oil in place.*

***Energy Africa is to acquire a 15% stake** in each of Triton Equatorial Guinea's 100% interests in blocks F and G in the Rio Muni Basin offshore the Republic of Equatorial Guinea.*

***Elf Exploration Angola and Angolan** national oil company Sonangol have announced a sixth positive exploration well, Orquidea-1, on block 17 in the deep waters offshore Luanda.*

General

***Amec has formed a strategic alliance** with major US contractor Fluor Daniel to address the offshore floating oil and gas production systems market on a worldwide basis.*

IP to manage major research project

The Institute of Petroleum (IP) has reached agreement with the Centre for Marine and Petroleum Technology (CMPT) to take over the project management of the Joint Industry Project (JIP) on the Safe and Optimum Design of Hydrocarbon Pressure Relief and Blowdown Systems (RaBs). This change of project management is one of a number of such assignments where responsibility is being transferred to third parties as a result of organisational changes within CMPT.

The IP is already a major participant in the project and has been involved with the study since its inception in 1997. The project has two parts: first, to produce a guideline document covering the design and operation of relief and blowdown systems, and second, to investigate the methodology for sizing systems operating with fluids in two phases (eg gas and liquid). Work on the first part is nearing completion and an industry best practice document will be issued, by the IP, to sponsors shortly as an interim guideline.

The second, and more important, part of the study will include experiments to be carried out under contract by Imperial College using the BG Technology test site at Spadeadam. The tests will use mixtures of petroleum gas and liquids at various pressures in order to establish the validity of the models used by the industry to assess two-phase flow. The conclusions and recommendations will be incorporated into the interim document which will then be published as the final guideline by the IP. The project is due for completion in 2H2000.

The IP has appointed Sjoerd Schuyleman as Research Manager for the RaBs project. He comments: 'This is a very important project to the industry as it affects the design and safe operation of production facilities on offshore platforms worldwide. Fundamental research work of this kind on two-phase flow using hydrocarbons has never been carried out before and these experiments will provide the basic data necessary to improve safety and reduce costs. It also builds on the experience and results obtained from the experimental work we have carried out on tube failure in shell and tube heat exchangers. The transfer of responsibility from CMPT has gone very smoothly; it should be stressed that they have paid all invoices to date and transferred the balance of sponsors' money to the Institute to enable the work to continue essentially as planned'.

Current participants in the JIP are: Amerada Hess, Anderson Greenwood Crosby, Arco British, BG Technology, Brown & Root, The Expro Group, Genesis, Granherne, Health & Safety Executive, Institute of Petroleum, Marathon Oil UK, Mobil North Sea, Shell Expro, Statoil Norway and Total Oil Marine.

The IP is contributing £50,000 towards the total cost of the £350,000 study. Most of the equipment has now been delivered and is due to be assembled on site later this year. There is considerable scope for carrying out additional work using the test facilities available. For further information, or if you would like to become a sponsor of the project, contact Sjoerd Schuyleman on Tel: +44 (0)171 467 7132, e: **sfs@petroleum.co.uk**

BP Amoco and Arco merger update

Arco shareholders are understood to have approved the company's proposed combination with BP Amoco.

The all-share transaction, previously approved by the Boards of both companies, will involve the exchange of 0.82 BP Amoco American Depository Shares (ADS) for each Arco share. The merger remains subject to the approval of regulatory authorities, including the US Federal Trade Commission (FTC) and the European Commission.

Elf drops merger counter-bid for TotalFina

Elf Aquitaine has withdrawn its competing $51bn counter-offer for TotalFina after the French-Belgian company upped its bid for Elf to $54bn from $43bn. TotalFina is offering to swap 19 of its shares for every 13 Elf shares, valuing Elf stock at euros 190 per share. Both company's Boards have recommended the offer to shareholders. The French government has approved the merger which will create the world's fourth largest oil company.

TotalFina's Thierry Desmarest will Chair the combined operation, with Elf's Philippe Jaffre retiring. The Board will comprise nine Directors from the Elf Board, nine from TotalFina, and four currently representing the Belgian shareholders within the TotalFina Board.

In Brief

United Kingdom

***Centrica's proposed acquisition of the** Automobile Association (AA) has been backed by 96% of AA members.*

***Balmoral has secured a £35mn con**tract to manufacture buoyancy units for the deepwater Girassol oil field offshore Angola.*

***Training provider, Montrose Scota** Training International (MSTI) has been awarded a contract from OPITO to administer and manage its new technician training scheme for young people interested in the oil and gas industry.*

***Centrica has posted a 1H1999 loss of** £3,887mn, £238mn down on the same period last year.*

***BP Amoco has been awarded** Millennium Product status by the Design Council for its solar-powered canopies on service stations.*

***Shell is to sell its British head office,** Shell-Mex House, to a US property company, the Witkoff Group. Shell intends to vacate the premises by year-end.*

***Enterprise Oil has made a post-tax** profit of £36mn for 1H1999 compared with a loss of £2mn in the same period a year earlier.*

***Petroline Wellsystems of Aberdeen** has been acquired by oilfield service and equipment company Weatherford International for $165mn.*

***Construction company Amec has** reported a 20% rise in 1H1999 pre-tax profits to £27.1mn.*

Europe

***Independent oil refiner Petroplus has** announced a 27.4% rise in 1H1999 turnover to euro 470.3mn compared with the same period a year earlier. Gross profits increased by 34.4% from euro 26.2mn in 1998 to euro 35.2mn.*

***Coflexip Stena Offshore has main**tained that it is satisfied with its 1H1999 performance despite a drop in net profits of over one-third to $32.9mn (euro 30.9mn).*

***The Kvaerner Group has posted a return** to profitability in the 2Q1999 with a pre-tax profit of NKr46mn, and a net profit after tax of Nkr16mn.*

UK tackles transboundary air pollution

The effect of long-range air pollution is to be tackled by a new Expert Panel set up by the UK Government. The National Expert Group on Transboundary Air Pollution (NEGTAP) will examine the harmful effects of acid rain and excess nitrogen on the UK natural environment. It will also look at the prospects for recovery, following expected cuts in emissions.

The Group will look particularly at the trends in current and projected air pollutants coming from outside the UK and the resulting prospects for recovery. It will also consider the current assessment of when pollutants begin to have a harmful effect on sensitive environmental elements (critical loads). It will use this to map the locations of areas where critical loads for acidity and excess nitrogen are exceeded and will advise Ministers on their further development.

Shell to sell international coal concern

Shell is seeking buyers for its international coal business. Commenting on the August announcement, Shell Coal Chair, Karen de Segundo, in London said: 'Over recent years, Shell Coal has delivered an excellent performance and we feel that the time is now right for us to sell the business as a going concern. The decision reflects the fact that coal is a non-core business for the Shell Group'.

Brisbane-based Shell Coal Chief Executive Officer, Bob Scharp, described Shell Coal as one of the world's premier export coal companies with a diversified portfolio of high quality coking and thermal coals and a very large resource base. 'Over the past five years, we have invested more than $700mn in our coal business. Shell Coal's equity production has increased from 12mn tonnes in 1995 to an expected 18mn tonnes in 1999, generating sales of revenue of approximately $500mn.'

Shell Coal's assets include four underground and three opencut mines at five sites in Australia, as well as several major development projects. The company acts as operator in all cases. It also has interests in the management companies of three of Australia's major export coal terminals and 50% ownership of the 840MW Callide power plant currently under construction in Queensland.

In Venezuela, Shell Coal has an interest of approximately 25% in both the Socuy development projects and Carbones del Guasare, the joint venture operator of the country's largest producing mine.

Shell Coal was transformed into a separate 'stand alone' business within the Shell Group in July 1997, and located its headquarters in Brisbane. It also has active marketing and trading operations in Sydney and London.

A number of mining houses are understood to have expressed an interest in the sale, including London-listed companies Anglo American, Rio Tinto and Billiton.

New EU Commissioners announced

The European Parliament has confirmed the appointment of Spaniard Loyola de Palacio as EU Energy and Transport Commissioner for the next five years, reports *Keith Nuthall*. She is to be Vice President of the Commission and takes over the energy portfolio from Greek Christos Papoutsis.

De Palacio is a lawyer and conservative politician from Spain's ruling Popular Party. She has no energy background, having previously been Technical Secretary General of the Federation of Press Associations and latterly Spain's Minister for Agriculture, Fisheries and Food.

MEPs have also confirmed Swede Margot Wallstrom as the new EU Environment Commissioner, who will have responsibility for setting emissions policies. The accountant and social democrat has acted as Sweden's Minister of Civil Affairs (Consumer Affairs, Women and Youth) and Minister of Social Affairs, as well as Executive Vice President of Colombo, Sri Lanka-based Worldview Global Media.

The Parliament has also confirmed Erkki Likanen of Finland as Commissioner for Enterprise and the Information Society, replacing former Industry Commissioner Martin Bangemann. Likanen said that he plans to abandon the sectoral policies of his predecessor which tailored interventionist policies to particular industries, adopting instead a broad brushstroke approach, trying to boost the competitiveness of all EU industry. He is one of the few survivors of the old EU Commission which resigned en masse in March this year, where he served as Personnel Commissioner for the Services in Brussels.

In Brief

***Aberdeen-based BJ Services Company** reports that its bases in Piacenza and Pescara are the first oil services operations in Italy to have been certified to the ISO 9001 quality standard.*

***German engineering group Linde is** understood to have made a £2.3bn cash bid for Swedish gas company AGA.*

North America

***The US House of Representatives is** understood to have given approval for $8.2bn to be invested over the next two years to develop cleaner- burning fossil fuels, nuclear power and lower-cost renewable wind and solar power.*

***Tony Knowles, the Alaskan Governor,** is understood to have told BP Amoco that it must dispose of some of its Alaskan assets and make some other concessions before the state will approve the company's takeover of Arco.*

***Talisman Energy is reported to have** made a $1.2bn takeover bid for Rigel Energy Corporation of Canada.*

***Burlington Resources of Texas has** acquired Calgary-based Poco Petroleum for $2.5bn.*

***Enron Oil & Gas is reported to have** completed its split from Enron Corp and renamed itself EOG Resources.*

Russia & Central Asia

***KazMinCo of Kazakhstan is reported to** have sold its subsidiary Tabulat Oil Corporation to Romania's state oil company Petrom for an undisclosed sum.*

Latin America

***State oil company PdVSA has** appointed Hector Ciavaldini as President after Roberto Maldini resigned after seven months in the job. He was appointed to the PdVSA Board by Venezuelan President, Hugo Chavez.*

Africa

***Elf Gabon's results for 1H1999** remained unchanged at $39.6mn from the same period last year. The company claimed this was due to a 19% reduction of expenses offsetting a 16% drop in sales.*

NEWS Downstream

Western Europe's largest underground gas store

Wingas of Germany has extended its storage facility in Rehden, Lower Saxony, to create what is said to be western Europe's largest underground gas storage facility with a working storage capacity of 4.2bn cm of natural gas. The stored volumes are equivalent to one-quarter of the storage capacity available in Germany and are sufficient to supply about 2mn households with natural gas for an entire year. Wingas has invested Dm750mn in the project.

The underground gas storage facility, a depleted gas field, has been in operation since August 1993. It is mainly used to act as a buffer between the even flow of natural gas production and daily and seasonal fluctuations in demand, providing additional volumes of gas for the grid during periods of peak consumption and absorbing surplus volumes during periods of low consumption.

According to Burkhard Genge, President of Wingas, the extension of the Rehden facility has enabled the company 'to react even more flexibly to all the different customers' requirements that can arise in a liberalised energy market'.

When stored, the natural gas is compressed by seven compressors and forced into the porous reservoir rock through a total of 16 storage wells. The gas is withdrawn from the store through the same wells and then fed into the 1,600-km long Wingas pipeline network in Germany. Up to 2.4mn cm of gas can be supplied to customers per hour.

Wingas is a joint venture of Wintershall (65%) and Gazprom (35%) of Russia. The company currently holds over 12% of the German gas market under long-term contracts.

Oil embargo lifted

The European Union has loosened its oil and petrol embargo on the Federal Republic of Yugoslavia following the victory of NATO forces in Kosovo and handover of the province to a UN administration, reports *Keith Nuthall*. The EU Council of Ministers has now lifted the embargo to the mostly Albanian province and at the same time has agreed to allow sales to the Yugoslav state of Montenegro whose home-rule government did not oppose the NATO bombings.

In both cases, oil and petrol sold must be for domestic consumption and must not be re-exported to the rest of Yugoslavia. The move has been copied by eastern European countries wanting to join the EU, and also by Cyprus.

UK gas trading

As part of new gas trading arrangements, the UK Office of Gas & Electricity Markets (Ofgem) has designated EnMO as the independent market operator for the on-the-day commodity market (OCM).

OCM is a within-day, screen-based market that will allow shippers to trade gas to fine tune their positions.

The OCM system will also be used by Transco in its role of residual gas balancer.

According to Callum McCarthy, Director General of Gas Supply, more than 30 shippers have indicated their intention to trade in the OCM which has been implemented in a bid to provide a more flexible, cost reflective gas trading market.

In Brief

United Kingdom

Kuwait Petroleum (GB) has announced *plans to invest £1.5mn in its unstaffed petrol station technology and open a further six on-supermarket sites in the UK before the end of 2000.*

Essex-based tanker haulier JW Suckling *Ltd claims to have become the first UK company to register to the new British Standards BS EN 12798 – a road transport quality system that specifically refers to the safe transport of dangerous goods.*

The UK's largest independent petrol *retailer, Save, is in danger of a potential take-over bid, the company has reported. It has also declared it would not be paying shareholders an interim dividend following a 73% slump in its 1H1999 pre-tax profits.*

The UK Freight Transport Association *(FTA) has launched a high-profile lobbying and advertising campaign in a bid to fight government plans to further increase transport taxes. The FTA says that the highest rates of diesel duty and Vehicle Excise Duty (VED) paid by UK industry must be restrained or reduced as they are harming the UK transport sector, damaging UK industry's competitiveness and achieving no benefits for the environment.*

Texas-based company Enron has put *its gas-fired power plant Sutton Bridge in East Anglia up for sale less than a year after it first supplied electricity to the UK grid.*

London-based Simon Group is to purchase *ICI's Riverside bulk liquids terminal on the Tees at Billingham for £3mn. It is expected that about £2mn will be spent on upgrading the terminal over the next year.*

Wincanton Logistics has invested more *than £1mn in new state-of-the-art vehicles to service a fuels transport contract for Elf Oil UK. It has introduced 12 new ERF EC11 6x2 tractors and nine Thompson ADR 5000 trailer units.*

Software solution company Arciris has *been chosen by Elf Oil UK to pilot its integrated EPOS system – Iridium – at an Elf direct-managed site. Iridium is a Window-based EPOS application that incorporates integrated pump control, touch screen operation and promotional handling capability.*

NEWS Downstream

Fuel card sales on the up in Europe

Not only are fuel cards growing in popularity with both commercial and private customers, they are also proving to be an efficient tool for fuel retailers in maintaining customer loyalty, according to a new report from market analysis firm Datamonitor. The report contains a survey of the company's panel of 150 fleet managers across Europe, and reveals that once a fuel card retailer has managed to sell its fuel card package to a client, the new customer is almost guaranteed to remain loyal for a number of years. About 77% of fleet managers surveyed had not switched supplier in the last five years.

The report forecasts that fuel cards will account for 26% of total European fuel sales by 2008, up from 17% (43.2bn litres of fuel) in 1998. The penetration of fuel cards varies considerably between European countries – it is highest in Sweden at 73% of fuel volumes sold in 1998, and lowest in Italy and Greece at just 5%. Fuel cards had the second highest penetration in Denmark, at 70%, followed by Norway and Finland, both at 30%. In the UK, they accounted for just 14% of fuel volumes.

Shell is shown to be the leading fuel card distributor in Europe, with 14.1% of fuel card volume sales, equivalent to 6.1bn litres. The company distributes fuel cards across 17 western European countries and is the market leader in eight: Germany, The Netherlands, Denmark, Finland, Belgium, Austria, Switzerland and Luxembourg.

The newly formed TotalFina is the second largest fuel card distributor, with combined fuel volume sales of 4.6bn litres in 1998, equivalent to a western European market share of 10.6%. However, unlike Shell, some 80% of sales were in France. Datamonitor also reports that a merger between TotalFina and Elf Aquitaine would create a new dominant player in the fuel card market, with approximately 15.5% of fuel card volumes.

New UK gas safety regulations proposed

The UK Health and Safety Commission (HSC) has published a consultative document containing proposals to amend the Gas Safety (Management) Regulations 1996 (GSMR) which deal with the management of the safe flow of gas through the UK's natural gas networks.

The key objectives of the Regulations are to ensure security of supply, especially to domestic consumers, and to maintain the safety standards of emergency services provided by the gas industry. The proposed Gas Safety (Management) (Amendment) Regulations 2000 would introduce changes to GSMR which resolve some minor deficiencies and anomalies experienced by the Health & Safety Executive in enforcing the Regulations, clarify duties and make provision for new duty holders.

Q8 helps drive tanker driver training forward

The UK's oil tanker driver training sector has received a boost from Q8 Fuelcare with the company's donation of a four-wheel tanker to Banbury-based PTF Training. The rigid vehicle will be used to help reduce the number of tanker rollovers in the industry by allowing the launch of what is claimed to be the most practical training programme for drivers in the market.

Some 15% of the UK oil industry's 20,000-plus ADR approved tanker drivers in Class 3 are expected to benefit from the training over the next two years.

In Brief

BP Lubricants has launched three new *synthetic lubricants – Vanellus HT Extra 10W/40 and HT Ultra 5W/30 engine oils and Energear HT 80W/90 complete drive-line lubricant. All three products are produced using the company's hydrocracked basestock technology.*

Kuwait Petroleum (Q8) reports that it *has more than trebled its Scottish dealer base in the last 18 months from eight to 27 sites.*

Petrol pump manufacturer Tokheim is to *supply BP Amoco with pumps incorporating a Microsoft Windows operating system and web browser to facilitate connection to the Internet. The new pumps will not only provide customers with weather information, traffic updates and advertising, the Internet link will also allow each self-diagnostic pump to send e-mails to BP Amoco's main office detailing volume statistics.*

Foster Wheeler has secured the engi- *neering, procurement and construction management contract from Irish Refining to upgrade Ireland's only refinery at Whitegate in County Cork.*

Europe

Petroplus is in negotiations with Shell *regarding the acquisition of its Cressier refinery, tank storage depots, pipelines connected with the refinery and Swiss commercial sales activities for an undisclosed sum. Cressier, one of the two refineries in Switzerland, has a capacity of 65,000 b/d and supplies 25% of the domestic market. The acquisition would double the size of Petroplus' refining assets and output.*

HAL Holding has acquired a 10.37% *stake in the capital of bulk storage operator Van Ommeren.*

Tupras, Turkey's state oil refiner, is to *import up to 1.5mn tonnes of petroleum products after the country's biggest refinery was forced to close following the fire that started after a massive earthquake in August.*

Asia-Pacific

TOTAL Gas and Power India (TGPI), Tata *Electric Companies (TEC) and Gas Authority of India Ltd (GAIL) have finalised a cooperative agreement to import liquefied natural gas (LNG) to the state of Maharastra in India. Under the terms of the agreement GAIL will*

Lubricants initiative

BP Lubricants has launched a new 'BP Shield Environmental Programme' in the UK which, the company states, is designed to 'enable companies in the transport sector and engineering industry to meet their environmental obligations as simply and effectively as possible'.

BP Shield offers collection and disposal of all harmful oil-related waste, including used oil, oil filters, air filters, antifreeze, solvents/acids, paints, oily rags, contaminated fuels, soiled granules and batteries. Colour-coded bins are provided and BP deals with all waste in the correct manner, recycling whenever possible. The company will also provide and look after all relevant paperwork. The service also includes a 24-hour helpline and 24-hour emergency spill response.

In addition, BP's Environmental Manager will conduct site surveys to ensure premises meet all current legislative requirements, offering advice wherever necessary, and will provide a consultancy service to any company wishing to achieve ISO 14001 accreditation.

August UK fuel prices

	Pence per litre
Diesel	
Lowest: Belfast	73.63
Highest: Selkirk	75.56
National average	74.58
Unleaded gasoline	
Lowest: Bradford	71.49
Highest: Oban	73.32
National average	72.40
Four-star gasoline	
Lowest: Cambridge	75.82
Highest: Brighton	81.24
National average	79.14

Source: *PHH Allstar Fuel Report*

Vopak merger cleared

The European Commission has cleared the proposed merger between Dutch petroleum and chemicals storage and transportation companies Pakhoed and Van Ommeren, writes *Keith Nuthall.* The international firms are involved in tank storage for crude oil and petroleum products, as well as tanker shipping (inland, short sea and deep sea).

Brussels approved the merger after the companies agreed to divest part of their liquids storage terminals in Rotterdam and Antwerp, addressing concerns that the merger would lead to the new joint operation Vopak dominating this sector (see *Petroleum Review*, August 1999).

The companies will now sell the Paktank Pernis and Botlek terminals in Rotterdam and all of Van Ommeren's shares in Gamatex in Antwerp.

acquire a 33.33% interest in Indigas, a joint subsidiary of TGPI and TEC, thereby lowering the stake of the two current partners to 33.33% each. Indigas is to build a terminal for importing LNG into the Bombay region.

Latin America

***PSG International has acquired a** 32.5% interest in the $266mn, 370mn cfld capacity Mayakan pipeline project which will transport gas from Ciudad Pemex to various points along the Yucatan Peninsula in Mexico. The company acquired the interest from InterGen when the pipeline was commissioned in September 1999.*

Africa

***Chevron has been appointed project** manager for the West African Gas Pipeline (WAGP) project which is due to be commissioned in 2002. The $400mn pipeline will initially ship 120mn cfld of Nigerian gas to power generation customers in Ghana, Togo and Benin.*

***Elf Aquitaine of France is reported to** be bidding for a 37% interest in the Ivory Coast's national oil refining company, Société Ivoirienne de Raffinage (SIR) which is being offered for sale by the government. The Ivory Coast government currently holds a 47.25% stake in the refiner. Burkinsa Faso holds 5.39%, while the remaining equity is held by five international companies: Elf, Mobil, Shell, Texaco and TOTAL.*

UK Deliveries into Consumption (tonnes)

Products	†July 1998	*July 1999	†Jan–July 1998	*Jan–July 1999	% Change
Naphtha/LDF	283,980	249,493	1,760,523	1,853,308	5
ATF – Kerosene	872,646	897,169	5,072,754	5,356,997	6
Petrol	1,880,953	1,885,724	12,569,135	12,408,668	–1
of which unleaded	1,482,822	1,640,673	9,704,351	10,517,464	8
of which Super unleaded	36,344	31,585	242,714	203,488	–16
of which Premium unleaded	1,446,478	1,609,088	9,461,637	10,313,976	9
Burning Oil	206,647	136,628	2,033,584	2,082,650	2
Automotive Diesel	1,319,231	1,279,616	8,748,461	8,728,472	0
Gas/Diesel Oil	575,657	521,822	4,152,785	3,976,015	–4
Fuel Oil	211,684	139,217	1,673,981	1,271,068	–24
Lubricating Oil	71,568	68,166	493,114	462,276	–6
Other Products	609,973	655,199	4,658,102	4,932,211	6
Total above	6,032,339	5,833,034	41,162,439	41,071,665	0
Refinery Consumption	557,827	489,428	3,795,840	3,642,460	–4
Total all products	6,590,166	6,322,462	44,958,279	44,714,125	–1

† Revised with adjustments *Preliminary

Please note that there was an error in the statistics for the above table as published in the September 1999 issue. The Jan–June 1999 cumulative total for automotive diesel should have read 7,448,856 and the percentage difference 0%.

IPE – A turbulent coming of age

The transition from adolescence to adulthood is often turbulent, and the International Petroleum Exchange (IPE) – which turns twenty next year – now appears to be experiencing many of the problems associated with coming of age. *Chris Chew* reports.

While there is absolutely no suggestion that the current events at the IPE will in any way affect its ability to function as Europe's principal energy futures and options exchange, its role as the principal price-setter for so much of the world's internationally traded oil means that the exchange's current attempts to find a more appropriate structure for the future are of more than passing interest to anyone affected by crude oil prices.

The IPE currently offers four energy-related futures contracts: Brent Crude, Gas Oil, Natural Gas and Fuel Oil. Of these, by far the most important is Brent, which trades a daily volume equivalent to some 80% of total daily world oil consumption. Because the Brent contract is used as a benchmark for other light sweet crudes, the price of some two-thirds of the world's internationally traded oil is actually based on the IPE's Brent quotation.

The IPE's growing pains burst into the public domain this summer when both the Chairman and Chief Executive resigned, following the failure of their proposal for the IPE to demutualise. The IPE's problems really centre on its governance, and particularly its slow and cumbersome decision-making process. The problem may be simple to state but, as the summer's events demonstrated, arriving at an acceptable solution may be much more difficult.

The IPE was originally created as a mutual organisation – one owned entirely by its members. Operational decisions are taken by the Chief Executive and the management team, but any strategic decisions, and especially those requiring a change to the exchange's rules, require not only a lengthy consultation process, but also approval by at least 75% of the members.

Times are changing

This structure worked well enough when the industry was simpler, when changes in trading technology were slower, and when competition between exchanges for business was almost unheard of. But all this is changing. The introduction of screen-based trading systems means that new contracts can be set up relatively quickly and cheaply, and with far fewer overhead costs than the traditional open outcry system. Computers and cheap telecommunications have also greatly lessened the importance of geographical location and, with all exchanges eager to expand their market share, cross-border competition is here to stay.

A related, but separate, problem involves the exchange's financing constraints, again due in large part to its mutual structure. Under its current constitution, all profits made by the IPE must be returned to the members, so all major investment has to be approved by the full membership and cannot be funded directly from retained profits. This means that introducing new contracts is a relatively slow process and, in a competitive market where being the first is often the key to success, the IPE's mutual structure clearly puts it at a disadvantage.

Plan B – demutualisation

In order to overcome both the governance and the less-important financing problem, the Board – in what became known as Plan B – proposed in July that the IPE should demutualise. The second part of the proposal was that 70% of the IPE would then be sold to a group of five corporate investors for a cash consideration of £26mn.

The outside investors would then be responsible for managing the long-term future of the exchange and would also contribute investment capital, technology and a clear business strategy. The IPE had earlier conducted a competitive tender that had attracted interest from 15 outside investors, and the five Plan B investors – BG, Distrigas, Enron, Nord Pool and the OM Group – were those that had made firm offers during the tender. Just to complicate matters, Nymex – with whom the IPE has close links – having earlier expressed little interest, entered with a matching bid of its own at the last moment.

To highlight the importance of its proposal, the Board had made the issue a vote of confidence and so, when the proposal to demutualise only achieved 63.7% of the votes in favour, the Board resigned and both the offers lapsed. The reasons for the rejection are still far from clear, although, perhaps ironically, concern over losing control of the decision making process seemed to be one of the main objections, especially on the part of the IPE's biggest single shareholder, ED&F Man, which owns 9% of the voting rights.

In contrast, 86% of the locals (private traders), who each stood to receive a windfall gain of around £69,000 on demutualisation, were in favour, as were 72% of the member firms, which could have received £275,000 per seat.

Facing the future

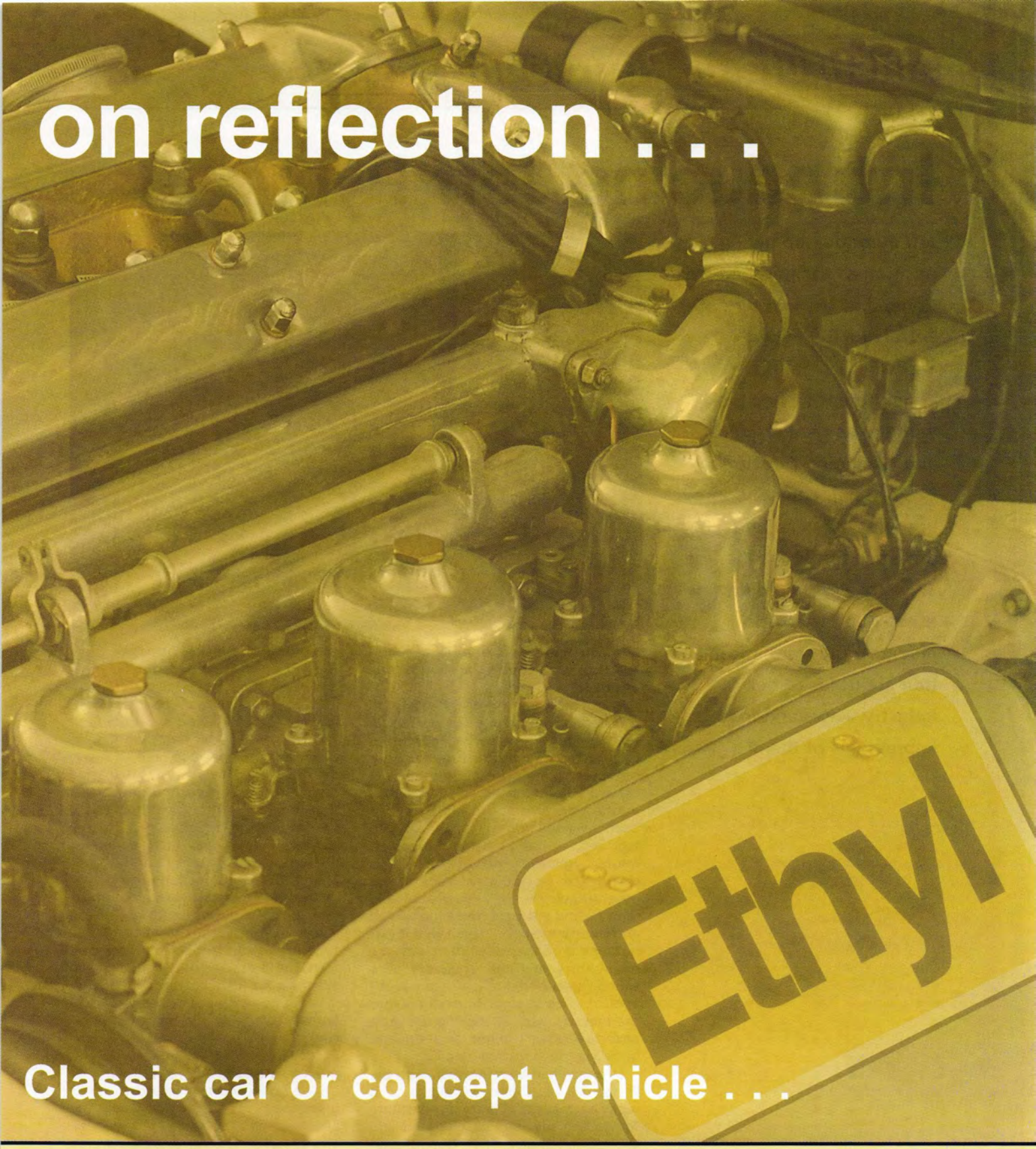
So where does the IPE go from here? Notwithstanding the vote, the IPE is still widely perceived to need a better method of governance, and its plans to introduce a raft of new contracts in European electricity trading, natural gas and emissions permits will need additional capital and much management time.

The relative merits of open outcry against screen trading continue to be debated vigorously but, as the introduction this year of the Fuel Oil contract has shown, it is still possible to construct a cost-efficient open-outcry system, provided the existing infrastructure can be adapted. However, the IPE is also gaining valuable experience of screen-based trading though its Natural Gas Contract, so the exchange is already well placed to manage the technical aspects of the evolution from open-outcry to electronic trading.

Managing the social implications of this change may be less easy, although the enthusiasm of the locals for demutualisation suggests that ultimately it is probably more a matter of price than principle.

The IPE now has a new Chairman, Sir Bob Reid, and it is understood that there have been further discussions not only between the IPE and Nymex but also with some of the five Plan B investors.

While it is unlikely that Plan B itself will be resurrected, recent events at LIFFE (London International Financial Futures Exchange) and other exchanges have underlined the fact that change, at some stage, is inevitable. It can therefore only be a matter of time before proposals for a new structure emerge that will finally mark the IPE's coming of age.



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Introducing Jeff Pym

Jeff Pym took up his position as the new Director General of the Institute of Petroleum (IP) in mid-September. Until his appointment he had been working as the President and Managing Director of BP Portugal, having worked in senior management positions for BP for the last 17 years. _Petroleum Review_ asked him to provide readers with more information about his career, industry views and first impressions of the IP.

Q You have had a long association with the IP. Can you tell us about it?

A My association with the IP goes back to my schooldays. In fact, a teacher and the IP were the key reasons I joined the oil industry. It came about because at my school there was a teacher who had been an oil executive in the Persian/Arabian Gulf. He had been invalided home and had taken up teaching, as well as being the careers master. However, his first love was clearly the oil industry. Tales of his adventures in the Gulf, information and films he had got from the IP [he was an enthusiastic member] meant that it was not long before I was smitten with the oil industry and the prospects of a varied career and international travel. I applied to go straight from school into the industry, with BP making the most attractive offer. I joined as a student, initially as an industrial chemist.

So I have had an association with the IP for 36 years and coming back is repaying a great debt to the Institute for getting me into such a good and interesting industry. I hope that through the IP my association with the industry will continue for a long time yet.

Q You have had a 34-year career with BP. Can you tell us a little about what you were doing and the jobs that gave you most pleasure and satisfaction?

A I have to start by saying that I've enjoyed more or less everything I have done in the industry. It has all been interesting, broadening and enhancing of life skills. Obviously, there is great satisfaction as seniority grows and one's ability to make a difference increases. If asked to pick out particular highlights I think I would identify four.

Early in my career I was working in Canada on the development of heavy oil reserves. This was a fascinating period, full of cultural and intellectual challenges. I learnt a great deal about fundamental technical aspects of the industry – geology, fluid dynamics, porosity, permeability and other aspects of the production process.

Negotiating the LNG export contracts with Japanese buyers for BP in Australia was a very different challenge. At the time it was the largest ever LNG contract. The deal proved very good and an exemplar for BP in later negotiations.

Working within the new BP Oil Europe company gave me the opportunity to create and sustain a new European business – LPG – for BP. This proved successful and rewarding.

I am honoured to have been closely associated in the success of the European joint venture between BP and Mobil in the downstream sector. This represented a huge challenge in bringing together two very different cultures and taking the best of both to forge a new and distinct culture. In most European countries BP was the larger partner, with the split typically 70:30. In Portugal, however, the situation was reversed. This presented particular challenges in integration and in creating trust and cooperation between individuals from different corporate backgrounds.

Q The industry and major oil companies such as BP Amoco are in the midst of change and upheaval. How do you see the industry developing? What do you think this implies for the bodies such as the IP that provide services and support for the industry?

A The key driver changing the industry is stakeholders becoming ever more demanding – particularly shareholders and customers. Shareholders are seeking greater and more reliable (predictable) returns on their capital invested. Otherwise, they simply move their funds. Customers are, rightly, more demanding than ever in terms of quality, value for money and standards (technical, health and safety) of the goods they buy.

Consequently, there are huge pressures to produce more and better for less and less. This results in an inevitable pressure to optimise process(es), minimise costs and maximise quality, efficiency, etc. The way a company achieves this places greater demands on industry suppliers – to whom the industry is itself a supplier – and on its own processes and procedures.

Over recent years most companies have looked at internal reorganisation, and this process will continue. However, many companies are now looking for scale economies via mergers, acquisitions and joint ventures. There seems no reason to see an early end to this process. Performance and efficiency are the guiding principles for all industries, including the oil industry, and this means that current trends will continue. Reputation is becoming more and more important for companies and, as a result, reputation management – enhancing the value of the brand – is becoming a key activity as companies strive to balance the interests of customers, the company and shareholders.

The accelerating pace of change presents a considerable challenge for organisations, such as the IP, which support the industry. One response will be to offer to support industry by providing cost-effectively some of the functions that the companies in the mainstream industry no longer wish to perform themselves.

Q Clearly it is too early to ask you about direction and changes you wish to make at the IP, but would you like to make any general comments?

A Looking around I can see huge changes that have been made to the 'old' IP. I see a new dynamism and many new developments which are all highly laudable. It would be presumptuous at this stage to make detailed comments except to say that there will be an acceleration of the process of meeting the demands of the customers while enhancing a very strong brand of which all Members are justly proud.

I can, however, assure Members and staff that whichever direction we move in, there will be a full alignment in a shared vision of the future. ●

Gas dynamic sweeps Europe

The Brussels dream of a Single Market is nowhere developing more powerfully than in the Continent's natural gas industry. The development of natural gas markets will also be a potent factor in bringing together the existing 15 countries of the EU and the many aspirants anxiously seeking membership, writes *Fred Thackeray*.

The forthcoming liberalisation of gas transmission and wholesale marketing in the EU has hit the headlines. But no less commercially significant is the ongoing drive of the giants of the European gas business –Gazprom, Ruhrgas, Gasunie *et al* – downstream into the potentially remunerative gas distribution sectors outside their home countries. This is occurring in a wide range of markets where future fast growth of demand is anticipated. The markets of Hungary, Greece and Berlin are typical examples.

Downstream penetration includes equity participation in distribution companies to ensure market outlets. Russia's Gazprom, especially, has been master of this policy. But, short of equity investment, engagement downstream by several companies comprises contracts for niche supplies and services to meet peak demands.

These developments have been progressing steadily for several years. Now they have been overshadowed by more fundamental changes. Two events in the past year stand out as crucial. First was the final endorsement of the Gas Directive by its publication in the EU's Official Journal in August 1998; second was the opening of the Bacton-Zeebrugge Interconnector pipeline in the following October.

Neither of these events turned out quite like some expected. The Gas Directive was hailed with the announcement that 20% – and later more – of all EU gas markets were being opened to competition, encouraging visions of sharp reductions in gas prices. The Interconnector was expected to reinforce this by exporting UK gas and its then low spot prices to the Continent. But the Gas Directive does not enter into force until August 2000 and its implementation will be patchy due to numerous fudging factors by some resistant governments and by vested commercial interests.

The Interconnector is likely to proceed much as expected when it gets into its stride. Remarkably, however, not long after its inauguration, it transported gas in the reverse direction, from the Continent to the UK. This was to take advantage of winter prices in the UK, which were temporarily higher than the prices at Zeebrugge for imports from Norway, indexed as these were to disastrously low oil prices.

Changes ahead

Nevertheless, it remains true that revolutionary changes lie ahead in the gas industry throughout Europe. Demand for natural gas is continuing to expand rapidly. Over the past decade, natural gas consumption in the EU grew at an average annual rate of 4.2% to reach 354bn cm in 1998. In Europe as a whole average growth was somewhat slower due to eco-

Gas Directive Requirements

August 2000 – consumers using minimum of 25mn cm/y at one site; 20% of the market
Mid-2003 – consumers using minimum of 15mn cm/y at one site; 28% of the market
Mid-2008 – consumers using minimum of 5mn cm/y at one site; 33% of the market
Austria (consumption 7.4bn cm in 1998)
August 2000 – government proposed eligibility for all consumers but bitterly opposed by gas industry
Belgium (consumption 14.6bn cm in 1998)
August 2000 – consumers using 15bn cm/y
2007 – all consumers
Germany (consumption 79.5bn cm in 1998)
August 2000 – all consumers
Netherlands (consumption 36.9bn cm in 1998)
January 1999 – consumers using 10mn cm/y
January 2000 – consumers using 3mn cm/y
January 2002 – consumers using 170,000 cm/y
January 2007 —all consumers
Spain (consumption 13.1bn cm in 1998)
January 2000 – consumers using 15mn cm/y
January 2003 – consumers using 5mn cm/y
January 2008 – consumers using 3mn cm/y
January 2013 – all consumers

Table 1: Eligibility of consumers to switch suppliers

nomic setbacks in FSU countries and former Soviet satellites. Even so, taking all the 30 or so countries together, growth of natural gas consumption in the decade averaged more than 3%/y, nearly double oil demand growth in the same period.

The rapid expansion of gas demand is continuing. Following a rather small increase last year, in the first six months of this year consumption in the three biggest gas-using countries taken together jumped by almost 7%. These three countries – UK, Germany and Italy – account for two-thirds of natural gas consumption in the EU. If this pace of growth continues the prospect is that the EU's total natural gas use this year will reach about 378bn cm, over 60% above 1988 levels.

This buoyant growth is occurring without the additional stimuli that are to be expected from the effects of increasing competition for sales as the Gas Directive begins to bite. Coupled with this there will also be pressure to increase natural gas use, as the most environmentally friendly fossil fuel, to generate electricity. The impact that this could have was exemplified in 1H1999, both in the UK and in Italy, where gas consumption to produce electricity increased over year-earlier levels by 16.8% and 26% respectively.

Progress to date

One year after the Gas Directive emerged as a fact rather than a threat, it is pertinent to ask what progress has been made to get ready for its implementation next August. Equally important, is how soon, where and how much its effects will be felt. Progress has varied widely. The UK has already completed a world first with the full liberalisation of the markets down to the household consumer for both natural gas and electricity. A number of other countries have legislated or announced their proposed schedules for opening their gas markets to competition as shown in **Table 1**.

Preliminary information is also available on Italy and France. In Italy, legislation is under preparation that is due to reach the stage of parliamentary discussion no later than next February. The law that is likely to emerge will most likely set liberalisation in the first phase from August 2000 at 20% of the market. In France also, draft proposals set 20% market opening in the first phase.

The five countries listed in Table 1, together with the UK, Italy and France, used 339bn cm of natural gas last year or 95% of total EU gas consumption. The share of these markets that will be liberalised next August will significantly exceed the Directive's minimum of 20%. However, this picture of radical widespread liberalisation is illusory.

The situation in Spain, for example, is of particular interest. This is one of the fastest growing gas markets since receiving its first pipeline imports from Algeria two years ago. By 2005 its consumption could as much as double to some 26bn cm/y. But, although its timetable for liberalisation exceeds the demands of the EU Directive, there is actually limited scope for consumers to take advantage of these rules. The gas transmission network is predominantly in the hands of an almost nationwide monopoly, Gas Natural/Enagas. This monopoly is protected by a legal provision that no new pipelines will be authorised in areas already supplied by existing pipelines for the next ten years. Gas Natural has therefore, naturally, embarked on a very big pipeline construction programme.

There is, of course, a requirement – as in the EU Directive – that TPA (third-party access) must be made available to new suppliers under supervision of a government regulator. However, the principal new markets are for electricity generation in combined-cycle gas-turbine (CCGT) plants and the two biggest power generators, accounting for 75% of electricity production – Endesa and Iberdrola – are each knit into a complex of agreements with Gas Natural and Repsol (45% owner of Gas Natural). These cover extensive investments in new power plants and agreements for gas supplies that severely limit the scope for any new company.

Major projects are now moving forward for the construction of power plants at Bilbao and at Castellon to take LNG expected to come from Trinidad. This is a new source of supply and a new player is included – BP Amoco, which holds 34% of Atlantic LNG in Trinidad (Repsol holds 20%). BP Amoco also holds a major share in the projected regasification and power plants at Bilbao. But the other participants in Spain are not new, namely Repsol and Iberdrola in Bilbao (also a local Basque company, EVE) and Iberdrola in Castellon. There is, in effect, no new competition.

Maintaining market position

The determination of established suppliers to hold on to their markets is strong in every country. In Belgium, for example, Distrigaz until now has held exclusive rights to import, transmit and store natural gas. It has import contracts that appear likely to meet the whole of the country's demand over the next several years and has declared that it has contracted sufficient gas to meet 74% of its forecast of demand up to 2016.

In Denmark, DONG (Dansk Olie og Naturgas), hitherto with exclusive gas transmission rights, has signalled that it is trying to retain at least 80% of the Danish market. The Danish government, for its part, has been making a strong effort to amalgamate the Danish gas distribution system of five regional companies to provide a bulwark against the incursion of foreign competition.

In the Netherlands, Gasunie and NAM, producer of the giant Groningen field, dominate the industry. Both companies are owned jointly by Shell and Exxon, with 50% government participation also in Gasunie. The government has reluctantly accepted that liberalisation of the market is inevitable. However, it is attempting to carry this through without undue loss of government revenues and without weakening too much its policies for long-term security of supplies.

Gasunie has, nevertheless, already been compelled to yield ground to a limited extent to an independent group, PNEM/Mega, operating through a subsidiary, Entrade, together with another company, Delta. This group has built an independent 28-inch pipeline from Zelzate on the Belgian border to take supplies from the UK Interconnector. Gasunie, also taking supplies from the Interconnector, carried out its construction simultaneously with the building of a 36-inch line on more or less the same route.

Gasunie, as required, has published its tariff schedule and other conditions for TPA to its nationwide transmission and export network. This has been approved by the government, including a controversial requirement for hourly load balancing which potential users claim is a major obstacle.

The company has lost a small volume of market share and expects to lose more. Overall, however, its intention is that, through transport fees and fees for the provision of services, the outcome will be 'revenue neutral'.

Germany's growing market

The country where battles for markets are most likely is Germany. It is a big market. If nuclear power and/or coal-fired electricity are phased out in favour of gas by 'green' pressures, it will be a fast-growing market – although not otherwise. Despite the powerful position of Ruhrgas, there are also many other companies engaged in gas transmission, marketing and distrib-

ution. Most significant is Wingas, with its astonishing plans to construct within the next six to seven years a transmission network of big-inch pipelines totalling some 2,700-km. Much of this is already built and operating securing them a 10% share of the German market in 1998. Wingas is owned 65% by Wintershall (a subsidiary of the chemicals group, BASF) and 35% by Gazprom, Russia's gas monopoly. Its declared aim is to obtain 15% of the market. When its pipeline programme is complete, however, it could be in a position to take much more than that, even if it provides TPA to others, as it intends. Its completed network will comprise pipelines with import capacities at Germany's borders totalling about 60bn cm/y. This figure may be compared with Germany's consumption last year of 79.5bn cm.

There is, however, an important issue yet to be resolved in Germany that may cushion the effects of competition on market prices. This is the agreement now being hammered out within the industry for calculating TPA tariffs. The costs of transmission and distribution of natural gas form by far the greatest part of the overall costs for gas delivered to consumers. In Germany, the principal new competitor – Wingas – must necessarily seek pipeline tariffs high enough to reimburse its recent capital outlays; and one may surmise that Ruhrgas will be inclined to go along with this, even though its own pipeline investments must by now be largely written down.

Overcoming obstacles

The principal obstacle faced by would-be new suppliers in the EU is pre-emption of markets for several years to come by the import contracts of the incumbent marketers. This is particularly the case in Italy. The Eni Group's Snam had already contracted by early this year for imports totalling over 48bn cm in 2000, rising to 58.5bn cm by 2005 and 62bn cm by 2010. Combined with 4bn cm contracted by Eni's main competitor, Edison Gas, and 7.5bn cm contracted by the electricity group, Enel, this commitment indicates total contracted supplies in 2005 amounting to 70bn cm. But, on top of this, Snam has recently committed to a deal with NOC (National Oil Corporation) of Libya for a new trans-Med pipeline to import 8bn cm, starting at an unspecified volume in 2003. There is also a proposal announced by Edison jointly with Mobil (now Exxon) for an offshore LNG terminal off the Po Delta with a minimum capacity of 4bn cm/y to go onstream in 2003.

Depending on the pace of growth of Italian consumption, these agreements could well mean that the country is over-contracted for its gas supplies in the next few years. The outcome, however, has already been indicated in Snam's policy announcements. These envisage the development of Italy as a hub for gas supplies to neighbouring countries. It already provides transit facilities for Algerian gas to Slovenia and it is now embarking on two other transit projects. Jointly with INA of Croatia it is constructing a 330-km pipeline across the northern Adriatic to make supplies of 2.2bn cm/y to Croatia and to transit gas to other countries. And in the south it has made an agreement with Greece for a pipeline from Italy that could supply gas from Algeria to Greece and other Balkan countries. These projects will each take gas away from the over-supplied Italian market, but they will transfer to other countries a potential surplus of contracted gas.

Turkish question

The biggest question marks over future supplies and markets relate to Turkey. The prospective growth of the market is itself extremely uncertain. The forecast made by the pipeline monopoly, Botas, foresees natural gas consumption rising fivefold from 10.7bn cm last year to 54.5bn cm by 2010. This is predicated on a huge programme of power plant construction. This programme has been in a state of paralysis until very recently owing to the refusal of the Turkish authorities to accept foreign power plant proposals incorporating provision for disputes arbitration outside Turkey. This problem may now have been resolved. The prospective growth of gas requirements remains uncertain, however. An independent forecast of Turkey's gas demands made in 1997 by the IEA (International Energy Agency) anticipated growth to 27.5bn cm by 2010, or roughly half that now forecast by Botas.

The doubts over the growth of demand in Turkey are coupled with uncertainties about sources of supply. That there will be plenty is not in doubt. The question is which will they be? There are two principal contenders. One is the Blue Stream project of Gazprom and Eni, including a submarine pipeline at over 2,000-feet water depth across the Black Sea. The other, strongly encouraged by the US government, is the TransCaspian project for supplies from Turkmenistan. This, sponsored by PSG (Bechtel/GE Capital), has recently gathered momentum with the accession of Shell as a 50% participant. Both Blue Stream and the PSG project aim to supply Turkey with 16bn cm/y. The PSG project also envisages extending through Turkey into the Balkans.

A further complication arose in August when BP Amoco announced a gas condensate discovery with major gas reserves at Shah Deniz in Azerbaijan on the route which would be traversed by the PSG/Shell line. This, of course, adds further to the abundance of potential supplies to Europe, if the markets grow fast enough to need them and can be prised away from the established suppliers.

UK market

Against this background of multiple potential new sources of supply – Nigeria is another not mentioned above – it may seem less important that, in terms of incremental supply, the Bacton-Zeebrugge Interconnector has capacity of 20bn cm/y, of which some 15bn cm has probably been booked. The essential difference, however, is that it is already in place and working, backed by a persisting surplus of North Sea gas in the hands of a large number of independently operating producers. Currently, in the weak markets of summer, the month-ahead spot prices in the UK are around 10 pence/therm, approximately the equivalent of $1.60/mn Btu. This is the same level as prices under long-term gas import contracts at Zeebrugge when crude oil was at its lowest ebb earlier this year. Now, however, the long-term import prices are edging upwards, linked, but with a lag, to rising oil prices.

UK spot prices are subject to quite separate influences. They result from gas-to-gas competition under conditions of surplus. As long as these conditions persist, there will continue to be lucrative opportunities for trading North Sea gas in Continental markets. How long the British industry will continue in surplus is a key element in the future role of spot supplies in Europe. One factor at present is the policy of the UK government to forbid new CCGT plants – other than combined heat and power (CHP) – in order to help the rump of the British coal industry.

In writing this article Fred Thackeray has drawn facts and analysis from a Management Report which he has recently completed on European Natural Gas to be published in November at £395 by Financial Times Energy.

Gas-fired power generation to boost Taiwan's LNG imports

Taiwan's growing use of natural gas for power generation is expected to support a steady increase in LNG imports over the next decade. By 2007 gas-fired power plants are expected to account for almost one-third of the country's total installed generating capacity and generate almost one-quarter of the all electricity output compared with about 15% of total electricity generation today. *David Hayes* reports.

City Gas storage tank (made from LNG feedstock), Great Taipei Gas Co

With two more power plants due to begin burning gas this year, state-owned Chinese Petroleum Corporation (CPC) – which currently holds a monopoly on gas imports – has announced plans to import 4.5mn tonnes of LNG in 1999, a 14.5% increase in volume compared with 3.93mn tonnes in 1998. While other Asian countries have still to recover from the regional economic crisis, Taiwan has managed to escape its worst ravages. Industrial output remains buoyant as Taiwan's thriving hi-tech companies have found new export markets in the US and have been relatively unaffected by the business slump in neighbouring Asian countries.

'At the moment the economy is not so good, but not so bad. Our energy sector has not been affected that much,' commented a CPC executive. 'Last year we reduced our previously planned LNG imports by three cargoes totalling 170,000 tonnes. This was allowed under our contract. We made that decision at the beginning of 1998 as we knew Taiwan Power Company (Taipower) would reduce their LNG use at three power plants. In fact, we planned to reduce our imports by four cargoes but we got one cargo back as Taipower later increased its LNG requirement.'

Promoting gas use

Although Taiwan is a small LNG importer compared with neighbouring Japan or South Korea, the government plans to boost the gas share of Taiwan's total prime energy mix to a level close to that in western Europe and North America. Plans call for the natural gas share of Taiwan's primary energy consumption to increase from about 3% at present to between 10% and 12% by 2010.

According to recently published government forecasts, long-term plans to develop natural gas consumption will require LNG imports to increase almost two-and-a-half times from 3.93mn tonnes in 1998 to 9.31mn tonnes in 2011. Power generation will account for almost all the planned increase in LNG consumption as industrial and commercial consumption of natural gas is expected to grow by about only 15% over the next decade.

'It is difficult for city gas companies to build transmission pipelines to supply new communities,' the CPC executive noted, 'so it is easier for people to use LPG than natural gas as many people here do not like gas pipelines. This is different to the situation in Japan and South Korea. Residential gas use in Taiwan is mostly

for cooking and water heating, but people do not want pipelines in their backyard.'

LNG terminal expansion

As part of preparations to increase LNG supplies to meet the large planned growth in gas consumption, CPC is close to completing a major expansion at the Yung An LNG receiving terminal. Located near Kaohsiung in the south, Yung An is Taiwan's sole LNG import facility, although the government currently is considering various offers from private companies to build a second LNG terminal in the north near Taipei.

The Yung An Phase Three expansion programme involves investing NT$27bn in expanding the terminal from its Phase Two capacity of 4.5mn t/y to handle up to 7.75mn tonnes of LNG annually once construction of the new facilities is completed later this year. Apart from expanding LNG handling and storage facilities, Phase Three includes building a submarine gas pipeline from Yung An up Taiwan's western coastline to supply gas to four power stations in northern Taiwan as well as increase feedstocks to city gas companies in the Taipei area.

Completion of the 306-km undersea gas transmission pipeline which runs from Yung An terminal to landfall near Tungshiao power plant has been set for December 1999. An overland pipeline section is being constructed as a branch line near landfall in northern Taiwan to supply the nearby Changsheng power station. Built by the ABB-backed Everpower consortium, the 900 MW Changsheng station will be the first of a series of Independent Power Producer (IPP) power plants to start up in Taiwan, three of which are planned to burn imported LNG.

CPC has signed a 410,000 t/y LNG supply contract with Everpower for the Changsheng plant. In fact, as both of the station's 450 MW combined cycle blocks could burn between 300,000 tonnes and 350,000 tonnes, the actual LNG requirement could go up to 600,000 t/y after fuel burn tests are run following Changsheng's completion.

Changsheng is located near to Taipower's Tungshiao combined cycle power plant. Tungshiao will convert from oil- to gas-firing soon after the Yung An–Tungshiao submarine pipeline is completed later this year. It is expected to consume about 800,000 tonnes of LNG annually after the station is converted fully to gas-firing early next year.

CPC is currently negotiating 350,000 t/y LNG supply contracts with both the Hsingtao and Chiahui plant developers.

LNG-fired generation will continue to develop quickly in northern Taiwan as Taipower plans to build a large combined cycle station at Tatan. Although Taipower would prefer to build a coal-fired station, environmental considerations and difficulties faced obtaining planning permission from local governments mean that approval to construct a gas-fired station is easier to obtain.

LNG tanker at Yung An LNG terminal, Chinese Petroleum Corporation (CPC)

Taipower plans to equip the Tatan station with 12 combined cycle units totalling 4,384 MW installed capacity. The units will be commissioned over a four-year period from 2002 to 2006. Tatan eventually will burn 1.88mn tonnes of LNG a year once the plant operates at full capacity in 2007.

Security of supply

With LNG consumption for power generation due to grow throughout the next decade, CPC is planning to expand Yung An terminal further to handle 9mn t/y, and wants to develop the terminal to handle at least 12mn t/y eventually. However, with LNG imports rising so quickly a number of energy experts believe that Taiwan will need to build a second LNG import facility quite soon to provide security of supply should any problems occur at Yung An.

Although CPC still plans to supply the Tatan power station with LNG, it is very likely that Tatan will be supplied with LNG from a second import terminal which will be constructed close to the power plant site. However, the final outcome is far from clear as the government has still to select which local and foreign companies will undertake the project.

With the government favouring greater private sector involvement in Taiwan's energy sector, there is a strong possibility that a second LNG terminal may be built and run by a private consortium, resulting in the end of CPC's LNG supply monopoly.

Until recently Taiwan's Tuntex Distinct Corporation was widely expected to be selected to build a second terminal. However, the company has run into financial difficulties, throwing doubts on its ability to raise the necessary finance to construct the second LNG terminal. As a result, a number of foreign companies – including Mobil, Shell and Esso – have submitted plans to the government to take over the second LNG terminal project. Apart from proposals to develop the original Tatan receiving terminal site, one company is understood to have suggested building an offshore LNG terminal near Tatan. If any foreign company is selected, the investor would be expected to form a consortium with at least one local partner. CPC, it seems, is not on the list. 'We are ruled out of the second LNG terminal project', the CPC executive commented. 'The government has said we can participate as a minority

shareholder, but we do not think we will do it.'

CPC's preferred choice is to continue developing Yung An LNG terminal where studies have shown there is sufficient space to substantially expand the terminal's handling capacity. In late 1997 CPC revised a previous feasibility study to expand Yung An terminal to handle 12mn tonnes or more a year. In fact CPC engineers believe that Yung An can be expanded to handle 15mn t/y in future.

Gas supply contracts

Meanwhile, due to uncertainty over future arrangements for Taiwan's LNG import expansion, CPC has deferred signing any new long-term LNG supply contracts. 'We may have a new LNG contract to start in 2002 but we will not sign any new contract this year,' the executive said. 'We do not expect that LNG demand will be affected by an economic downturn. Most of our LNG goes to Taipower and Taipower honours its contracts.'

At present Taiwan imports LNG from Indonesia and Malaysia. In 1998 Malaysia supplied about 2mn tonnes of LNG under a 2.25mn tonne long-term contract that started up in 1995. Indonesia supplied about 1.93mn tonnes of LNG last year, including 1.5mn tonnes under its first long-term contract with CPC and about 100,000 tonnes under the second long-term contract which started up in 1998. The remaining Indonesian LNG cargoes last year were supplied under various short-term contracts.

Under the second contract Indonesia will increase its shipments to 750,000 tonnes in 1999 and 1.5mn tonnes in 2000. By 2001 Indonesia will supply the second full contract volume of 1.84mn t/y.

In future CPC is expected to begin importing LNG from the Middle East. A Letter of Intent has been signed to import from Qatar's Ras Laffan (Rasgas) project, although no quantity has been agreed. Malaysia, Australia and Yemen also are trying hard to sign long-term contracts with CPC.

Nanpu LNG-fired power plant, Taiwan Power Company

Domestic gas production

Apart from importing LNG and oil-related products, CPC is responsible for Taiwan's domestic gas production which is equivalent to about 600,000 tonnes of LNG per year. All production is onshore in Miaoli county in northern Taiwan since the northern offshore CBK field reserves ran out several years ago. At the current rate of production, CPC estimates Taiwan has another 10 years of gas reserves. Most of Taiwan's domestic gas is supplied to state-owned Taiwan Fertilizer Company. The rest is supplied to industrial customers, many being small enterprises located near the onshore gas fields.

CPC supplies large customers direct while piped gas distribution is handled by 22 city gas companies. In 1998 city gas companies bought over 600,000 tonnes of LNG as feedstock from CPC. Apart from city gas companies, customers include CPC's own Kaohsiung oil refinery which uses 500,000 tonnes of gas a year as a replacement for oil.

In 1998 some 2.3mn tonnes, amounting to 58.5% of Taiwan's 3.93mn tonnes LNG imports, were supplied to Taipower to fuel the Talin, Hsinta and Nanpu power stations in southern Taiwan. The remaining 1.6mn tonnes was supplied to industrial, commercial and residential customers.

Imported energy

With few indigenous energy resources of its own, Taiwan is largely dependent on imported energy. Because of their economical running costs, coal-fired stations and nuclear power are Taipower's preferred fuel source. However, rising environmental awareness among Taiwan's 22mn population has created many difficulties for Taipower in getting plans approved for new coal-fired and nuclear stations.

For the moment the main beneficiary of Taipower's difficulties is the LNG industry. Long-term plans to develop the use of gas-fired electricity generation call for power station consumption of LNG imports to grow more than three-fold from 2.3mn tonnes in 1998 to about 7.54mn tonnes in 2010. Taipower will account for 1.88mn tonnes of the increase in LNG consumption for gas-fired generation with the planned construction of the 4,000 MW Tatan combined cycle station in northern Taiwan where the first units are expected to be commissioned in 2003. The remaining additional gas requirement will come from IPP power stations which are expected to require 2.26mn tonnes of LNG by 2010. By then at least four gas-fired IPP schemes are due to be in operation.

Coal-fired generation

Taiwan's long-term plans to develop the use of coal-fired generation will involve power plant coal consumption increasing by about 50% from 21mn tonnes in 1998 to reach about 30.35mn tonnes in 2007. Taipower's coal requirement for 2007 is expected to be about 21.35mn tonnes while coal-fired IPP plants are expected to burn about 9mn tonnes of coal depending on the actual electricity requirement that year.

Coal has been a major source of power generation for Taipower since overtaking oil-fired generation earlier this decade. Almost all coal is imported, as domestic coal supply for power generation totals just 90,000 t/y.

Looking to the future

With nuclear power planned to remain Taiwan's other baseload energy source, the main change in fuel use in the coming years will be a sharp rise in gas-fired generation and a corresponding decrease in oil-fired generation.

From now until 2007 power generation from gas-fired stations is planned to increase three-fold as gas increasingly is used for baseload generation rather than peak shaving. Apart from new gas-fired stations under planning, the gas share of generation will continue to increase as many of Taipower's oil-fired units are due to be converted to gas-burning.

Gas-fired power station units 5 and 6 (right-hand side), Taiwan Power Company

Sulfur removal raises a stink

Governments are enacting rules to remove sulfur from fuel products. *Gordon Cope* looks at the costs, benefits — and drawbacks — of the legislation.

New regulations regarding the levels of sulfur in fuel refined in Europe and North America are scheduled to come into effect at the advent of the millennium. The EU currently allows a maximum of 500ppm of sulfur in gasoline and diesel. On 1 January 2000 this level is to fall to a maximum 350ppm for diesel and 150ppm for gasoline. On 1 January 2005 it will fall to a maximum of 50ppm for diesel and gasoline.

In the US, the Environmental Protection Agency (EPA) has proposed a rule to reduce the average sulfur content in gasoline to 30ppm by 2004. Diesel regulations are set to follow. In Canada, the federal government announced regulations that will require the average sulfur content of gasoline to average no more than 150ppm by 2002 and 30ppm by 2005. A reduction in diesel averages may soon be promulgated.

The primary reason for reducing sulfur in fuel revolves around air quality: it will diminish adverse health problems associated with urban smog, and it will increase the efficiency of emission control devices in cars. 'The EU has a voluntary agreement with car manufacturers to reduce CO_2 emissions by 25% by 2008,' says Dr Claire Holman, an air quality expert based outside Bristol. 'They will use de-NOx catalysts, which require low levels of sulfur to operate.'

'The Environmental Protection Agency made the rule based on two reasons,' says Marc Meteyer, Issues Manager for the American Petroleum Institute (API). 'They need these rules to meet national ambient-air-quality standards; and new, more-advanced technology cars are not designed for high-sulfur fuels.'

'The Canadian government views sulfur in gas as a significant health concern,' says Bruce Orr, Manager of Policy and Regulatory Affairs for Imperial Oil, a major Canadian refiner. 'Sulfur reacts with ammonia to form ammonium sulfate, which is dangerous to breathe.' (A recent epidemiological study by a Canadian task force tied high sulfur levels to bronchitis in children, asthma attacks and premature deaths.)

Depending on the jurisdiction, the regulations have created a varying range of reactions from the refining industry. 'We don't take issue with the fact that sulfur or air pollution is bad for your health,' says Bill Levy, Vice President of the Canadian Petroleum Products Institute (CPPI), a major refinery lobby group. 'We do take issue with the reduction of sulfur in gasoline.'

The CPPI notes that gasoline adds such a minor amount of sulfur to the air that it is almost impossible to detect. 'In Ontario, it amounts to 5,000 t/y,' says Kerry Matilla, also a Vice President for CPPI. 'Power generation in Ontario adds 200,000 t/y. In terms of particulates, it [the proposed reduction of sulfur in gasoline] drops levels in Toronto by 1.5%.'

'Sulfur in gasoline is not a big part of the total provincial inventory,' admits Ken Ogilvie, Executive Director of Pollution Probe, a Toronto-based environmental protection group. 'But the percentage of its delivered-dose in urban environments is considerably higher. It makes its impact on the sidewalk'.

In the US, the petroleum industry has objected to placing the problem of sulfur at the feet of refiners. 'There are only a handful of ozone non-attainment areas in the US, most of which are in the east,' says API's Meteyer. 'And most automakers are capable of making advanced technology vehicles that can operate on modest levels of sulfur and still meet air quality standards.'

Other experts take issue with the US position that emission control devices in cars can operate at moderate levels of sulfur. 'De-NOx catalysts need a maximum of 30ppm to work,' says Dr Claire Holman.

In the UK, the refining industry has moved well beyond the adversarial stage toward the compliance stage. 'The UK government first announced a 1 p/l differential for low sulfur diesel in November, 1996,' says Malcolm Watson, Technical Officer at the UK Petroleum Industry Association (UKPIA). 'The basic message is that if you're going to have a major product quality shift, you have to have time to react.' In fact, the UK industry's experience serves as an example for other jurisdictions to study. There are ten refineries currently operating in the UK, and British drivers consume 37bn litres of gasoline and 60bn litres of diesel annually.

Over the past several years, the UK Treasury adjusted duty rates to create a preferential rate for low-sulfur fuels. 'UK refineries can sell low-standard diesel for 50.21 p/l, and ultra-low sulfur diesel at 47.21 p/l,' says Watson. 'The 3 p/l can go to whatever extra costs are involved.'

The differential gives refiners financial room to manoeuvre. 'There is a whole range of alternatives,' says Watson. 'Some refineries can produce the material "as is", and some have the kit to modify.' Some UK refineries have invested in new catalysts, while others have run their catalysts harder (and thus incurred the extra cost of replacement). 'Others use the differential to compensate for the premium paid to European refiners for low-sulfur feedstock components.'

UK refiners also have a significant advantage when it comes to meeting sulfur targets – North Sea crude is low in sulfur.

North American refineries don't have the above-cited luxuries; most of the low-sulfur crude produced on the continent has been consumed, and the cost of importing low-sulfur feedstocks from Europe is prohibitively high. Their solutions to meeting regulations lie in the technical realm.

It's elementary, Watson

Canada's 18 refineries produce 35bn litres of gasoline and 25bn litres of diesel annually. In 1998, Canadian gasoline averaged 370ppm sulfur. Diesel for on-road use in Canada averages approximately 500ppm sulfur.

There are 160 refineries in the US. Annual gasoline consumption runs at approximately 470bn litres. Sulfur levels in gasoline average 340ppm. Removing the sulfur is no great mystery. 'The first step at all refineries is to refine crude oil by distillation,' says Imperial Oil's Bruce Orr. 'Essentially, water is added to remove salt, then the crude is distilled (fractionated through boiling), in an atmospheric distillation tower.' One of the fractions is raw naphtha, or raw gasoline. It contains about 600ppm sulfur.

'Raw naphtha has an octane level of 65,' says Orr. 'You want to get its octane level up to the high 80s or low 90s. You upgrade it in a catalytic reformer.' A catalytic reformer uses a fixed bed catalyst, such as platinum/iridium, which rearranges hydrocarbons so that they have high octane.

Because sulfur destroys the efficiency of the catalyst, however, it must be removed before the raw naphtha is fed

to the catalytic reformer. 'You remove sulfur with a "hydrofiner", a catalytic system (with a different catalyst), that scavenges all sulfur and converts it into hydrogen sulphide,' says Orr. By the time the naphtha goes through both the hydrofiner and catalytic reformer, the end product, known as reformate, has levels of sulfur below 1ppm.

Unfortunately, the above treatment is only applicable to the raw naphtha fraction; it leaves almost 80% of the initial crude unexploited. The remaining crude is therefore sent to a collection of distillation towers where ethanes, propanes and butanes are removed.

The bulk of the remainder, known as gas oil, holds most of the sulfur. The gas oil is then routed through catalytic cracking units that break the long-chain gas oil molecules into smaller chains. 'This second source of naphtha is called catalytic light naphtha, with sulfur ranging from 1,200–3,000ppm,' says Orr.

North American refiners then blend catalytic light naphtha with sulfur-free reformate naphtha, butane and other feedstocks to produce various grades of gasoline with a sulfur content around 350ppm. 'Most refineries have from seven to 14 gasoline-blend stocks,' says Orr. 'The trick is to make all grades of gasoline by optimally blending these components, and to have no surplus stocks left over.'

There's always a catch

While the obvious remedy to desulfurizing gasoline is to build more hydrofiners, the solution will not be cheap. Industry estimates place the cost of meeting North America's sulfur-content goals for gasoline in the range of $10bn. 'The technology for taking out sulfur is available, but it's costly,' says the API's Meteyer.

The refining industry in North America has been examining a new class of catalyst technologies that may cut the proposed cost of removing sulfur in half.

According to Orr, however, the challenge of the new technologies is to remove the sulfur without destroying the quality of the fuel, measured as an octane level. 'Today's catalysts are not selective,' says Orr. 'They preferentially saturate olefins (thus reducing octane levels), before they take the sulfur out.'

CDTECH of Houston is promoting one variation of the new technology. 'We want to retain as much olefins as possible,' says Richard Foley, Director of Markets and Economics for CDTECH. 'We use a two-column system. The first separates sulfur from olefins at the front end. The second removes it at two separate sections to maximise the retention of olefins.'

Refineries all over the world are having to make major investments to meet ever more demanding fuel specifications. Pemex's Cadereyta refinery, east of Monterrey, Mexico has recently completed a major upgrading programme

Mobil's new technology, called Octagain, has a different approach. 'It gives up on trying not to destroy olefins, and uses a catalyst system to react them back again (thus restoring octane levels), after the sulfur has been removed,' says Orr.

Exxon's technology, dubbed Scanfining, uses a sulfur-scavenging catalyst that is specifically engineered not to destroy olefins. 'It uses a nickel or cobalt/molybdenum fixed bed catalyst, then adds its magic powders to protect the olefins,' says Orr.

The main problem with the new sulfur-scrubbing technologies is that they have not been tested on a commercial scale. 'The National Petroleum Council (an expert body appointed by the US Secretary of Energy), does not think CDTECH will be ready for commercial use for another two years,' says the CPPI's Matilla.

This puts the squeeze on refiners. 'There's a four-year lead time for large capital investments, which means that refiners have to make a decision on the technology by 2000,' says Meteyer.

Canadian refiners have an additional problem. The federal government has mandated an interim target of 150ppm by 2002. The extra step will result in additional capital investment as a stop-gap measure. 'There are a number of refineries that have said, "Given the size, scale and cost, we don't think we can afford to do it,"' notes the CPPI's Levy.

Even if the North American industry decided to meet the targets using existing technology, they would still have to face the massive challenge of retro-fitting 100-odd refineries. 'You can't put the steel in the ground in time,' says Orr. 'These are thick-walled vessels, and delivery time can be 21 months. This is not a minor retrofit.' 'It was easy to remove benzene from gas – you just boil it,' says Orr. 'Removing sulfur is orders-of-magnitude more complex and costly. You will see a very shaky implementation path.'

The future is hazy

And what if the North American industry cannot meet the deadlines? Events in California point to a potential outcome. 'California has a gas formula that's different than anywhere else,' says Matilla. 'It has a low-sulfur, low-benzene, anti-smog mixture.' Recently, several major refinery breakdowns on the West Coast led to a supply crunch. According to Hart's *Octane Weekly*, an industry journal that tracks fuel prices, the wholesale rack price for one US gallon of gasoline in Los Angeles in August 1998 was 55.3 cents. By August of 1999, it had almost doubled to $1.03. In the same time period, the price in Houston rose from 42.59 cents to 66.36 cents.

'Low-sulfur gasoline is being phased into the US between 2004 and 2006,' cautions Matilla. 'Nobody knows what the supply will be.' While the task of removing sulfur from fuel may be Herculean, the costs astronomical and the outcome uncertain, refiners can take note of the UK's successful adaptation to stringent new regulations, and take heart.

'There are clearly large costs, and the industry has every right to closely scrutinise them,' says Pollution Probe's Ken Ogilvie. 'The [North American] refining sector has been quite ingenious in the past, however, and I am confident they will find a way. Everybody benefits from cleaner air.'

Abandonment projects in the offing

With the new millennium, the abandonment market in northwest Europe is set to move up a gear. The international regulatory framework has been set and some serious platform removal projects are now looming, writes *Nick Terdre*.

To date, only some of the small fry have been abandoned – gas platforms in the shallow waters of the UK southern basin and the Dutch sector of the North Sea, and a number of fields developed with subsea facilities and floaters. In these cases total removal of facilities, with the usual exception of pipelines, was the order of the day. So was it with the largest platform which has so far been abandoned: Esso's Odin in the Norwegian sector.

But now Phillips has a dozen redundant platforms on Ekofisk and the outlying fields, and Elf is preparing to shut down the five-platform Frigg field. In the UK, Phillips Petroleum is preparing to refloat the Maureen steel gravity-based platform (see *Petroleum Review*, September 1999), while BP Amoco sees a dwindling future for North-West Hutton.

Field licensees continue to ponder about costs, while enterprising contractors launch new concepts for cost-effective platform removal and prepare to build some of them. Meanwhile, sterling efforts are made to keep the old fields producing economically as long as possible, with some companies identifying themselves as mature asset management specialists.

Influencing the debate

As a deepwater quay based on hull sections of the Brent Spar floating storage tank takes shape at Mekjarvik near Stavanger, it is not unfair to say that the single event which has most marked the development of abandonment thinking, and lifted the topic into the public consciousness, was Greenpeace's intervention in Shell's original plan to dump the structure in the deep ocean.

Shell's Brent Spar has now been dismantled in Norway and sections of the hull used as the foundation for a deep-water quay near Stavanger

Whatever the rights and wrongs of what happened then, the ramifications of this event influenced governments as they prepared for the historic ministerial meeting of the Oslo Paris (Ospar) Commission in Sintra in summer 1998, which came down strongly against leaving platforms or bits of them at sea. Ospar ruled that where steel platforms were concerned, only those with jackets weighing 10,000 tonnes or more could be considered for exemption from total removal, and even then only the footing or base of the structure might be left.

Altogether there are 40 platforms which qualify for consideration for exemption from Ospar's ruling. The vast bulk – 33 – are in the UK, six in Norway and one in Spain. The list will not be added to as all installations emplaced after 9 February 1999 must be completely removed.

How many of the exemptible installations will actually be granted exemption is at present unknown. But comments attached by Ospar to its decision suggested that exemptions should not be easily given. Furthermore, the procedure described in the new set of draft decommissioning guidelines issued by the UK Department of Trade and Industry (DTI) this summer indicate that all sorts of hoops, including review by the Ospar contracting parties, will have to be passed through by any proposal for exemption. Anyway, by the time that most of these installations come up for abandonment, removal technology is likely to have advanced significantly from its present state.

Concrete decision

Ospar took a different line regarding concrete platforms, ruling that although the topsides should be removed to shore, a range of options could be considered for the substructure – complete and partial removal, leaving wholly in place, toppling and deep-sea disposal. The Commission's approach appears to reflect doubts that such platforms can be safely refloated, and hence a desire to limit their future use – a position which the designers of concrete platforms dispute. Even the mighty Condeeps in the Norwegian and UK North Sea, such the Gullfaks C platform, with its 240,000 cm concrete base and 22-metre deep concrete skirts, can be safely removed, according to a recent study by Norwegian designer Dr Olav Olsen. The company is now examining ways in which these massive structures can be dismantled and disposed of on land.

Oil companies, though not the supply industry, criticised the Ospar rulings, and not least for the additional costs they are taken as involving. In fact, post-Ospar cost estimates are rather hard to come by, although, last winter, analyst Wood Mackenzie calculated a figure of £8.5bn in real terms for the UK. UK Operators' Offshore Association (UKOOA) reports that its decommissioning committee is now preparing new estimates for the UK, which should be ready towards the end of the year.

The policy on concrete platforms is of immediate relevance, both to Elf, which has three concrete-base platforms in addition to two steel platforms on the Frigg field where production is likely to cease in a couple of year's time, and Phillips, which has the Ekofisk Tank among the 15 platforms which already have ceased production, or will in the not too distant future, at the Ekofisk centre and on outlying fields. The Tank has a 235,000-tonne base and is surrounded by a protective concrete wall weighing 52,000 tonnes. It will be interesting to see what recommendations are made by the respective owners concerning their concrete platforms – Phillips' proposals are due to be revealed when its plan is submitted in September as *Petroleum Review* went to press.

Possible solutions

Attention will also focus on what Phillips proposes to do with its steel platforms. The company has made an exhaustive investigation of all the possibilities, including the possible use of the jackets to form artificial reefs, a solution which is permitted under the Ospar regulations as it is defined as a form of reuse. All that is known so far is that all the topsides are to be retrieved to shore. The plan will be closely studied by the Norwegian authorities, and final approval is only expected in spring 2001. Phillips then plans to carry out offshore operations in the period 2003–2006. Implementation will, no doubt, be costly, but economies will accrue from the opportunity to deal with such a large number of platforms at the same time. For the time being the platforms are being, left in cold storage, though work is already under way with permanently plugging and abandoning some 100 wells.

New vessel concepts

Several new vessel concepts have been launched with the aim of reducing costs by removing topsides as a single unit, or at least in larger units than can be managed by conventional crane-barges. One which is already in operation is the Versatruss system which uses A-frames mounted on conventional barges to raise the topsides from the substructure. Some smaller platforms in the Gulf of Mexico have been removed by the Versatruss system, which most recently was used for the installation of small platforms in Lake Maracaibo in Venezuela.

Preparations for building the first Offshore Shuttle, an 18,000-tonne tubular construction, are now in hand – Marine Shuttle Operations, the owner of the concept, aims to award a contract to a main contractor before year-end and have the vessel ready for operation in autumn 2001.

In the Netherlands, Excalibur Engineering is planning to build the Pieter Schelte, a catamaran type vessel consisting of two rigidly connected tankers which, it says, will be capable of removing topsides up to 45,000 tonnes as a single unit, and jackets up to 25,000 tonnes. It expects to purchase the tankers later this year and have the vessel operational in 2002.

Then there is Master Marine's Master Mind, which uses tension-leg principles in the form of a tie-down system based on suction anchors to ensure a soft landing for the topsides during load transfer. At present the company says it will only build the vessel against a contract or a firm intent of one.

Finally, there is Olav Olsen's Multi-Purpose Unit (MPU), appropriately a removal vessel with columns and pontoons made of lightweight aggregate concrete. The MPU, which again is likely to be built only against a contract, can lift a 12,000-tonne topsides with a centre of gravity 27 metres above sea level, but also structures up to around 35,000 tonnes which have a lower centre of gravity.

Re-use option

No such vessel is required for removing Phillips' Maureen platform in the UK. This is an almost unique steel gravity base platform which Aker Offshore Partner has been contracted to refloat and tow to shore.

Maureen is a candidate for reuse – Phillips has both marketed it worldwide and has a possible new location itself, in the shape of the Kate field in the UK central North Sea. The first reuse of a whole North Sea platform is now likely to be achieved by Clyde Petroleum in the Netherlands, which has acquired a small Wintershall gas platform removed in 1997. In Norway, BP Amoco is considering reusing the 2/4-G riser platform at the Ekofisk field centre as a wellhead platform for its Tambar development.

The concept of reuse is still in its infancy in the North Sea, although significant portions of the drilling equipment retrieved to shore from redundant platforms in the Ekofisk area have been refurbished and sold on, much of it by Valiant Industrier in Stavanger, a company specialising in such operations. A reuse broking service, WEB Platform Brokers, was set up in the Netherlands earlier this year, and is marketing Elf's Frøy platform and equipment from the Frigg subsea satellites (see *Petroleum Review*, September 1999).

Drill cuttings debate

Another important area of focus for the industry is the drill cuttings mounds which have formed on the seabed under many drilling platforms. A recent study by Cordah and Rogaland Research found mounds up to 26 metres high containing 45,000 cm of material. Some of the material can be toxic. It has yet to be resolved whether it is preferable to leave such mounds in place – toxic materials have been found to leech out of them – or cause secondary pollution by moving or removing them.

Research into the problem is now gathering pace, with UKOOA and the Norwegian Oil Industry Association (OLF) coordinating their efforts to a large degree. UKOOA has set in train a drill cuttings initiative which includes regular consulting with relevant stakeholders. It has appointed Det Norske Veritas to manage its research programme, and in late August was preparing to award contracts for further studies.

Trends in jet fuel quality in the United Kingdom

Surveys summarising the specification properties of aviation turbine fuels supplied in the UK have been published annually by the Defence Evaluation and Research Agency (DERA) Fuels & Lubricants Centre since 1974.

DERA carries out this survey each year and also undertakes research into future jet fuel properties in support of its specification writing activities, on behalf of the Ministry of Defence. *P S Brook, G K Rickard* and *J O Whitby* report on current trends in fuel properties and their possible effects.

The data in the annual survey applies principally to the UK but is probably representative of the jet fuel quality in North West Europe. The most significant findings for the latest survey (1998) are as follows:

- *Acidity*

The acidity of jet fuel is rising at present, perhaps due to more acidic crude oils, such as North Sea crudes, being introduced. If this trend continues then gas turbine operators can expect an increase in fuel system problems. Typically, these will manifest themselves as corrosion problems.

Water separation will also deteriorate because the acidic species tend to have surfactant properties, leading to increased dirt entrainment. Previous research has also linked poorer thermal stability to an increase in jet fuel acidity.

- *Aromatics*

The aromatic content of jet fuel has been declining in recent years.

Widespread issues of elastomer compatibility could arise if levels shifted significantly from current values over a short period of time, but this is not predicted. Problems, however, could arise today from different batches of fuel having large variations in aromatics. For example, some jet fuel produced on the West Coast of the US contains as little as 5% aromatics whereas 'typical' jet fuel contains around 18%. In the UK the range of aromatics is 9.4% to 24% v/v with 86% of batches falling into the range 16% to 22% v/v.

Lower aromatics will affect the combustion in gas turbines by decreasing the flame radiation, turbine emissions and hot-end component life.

- *Distillation*

The distillation range of jet fuel is broadening, with both the initial boiling point decreasing (since 1991) and final boiling point increasing. Both of these properties could lead to problems for gas turbine operation.

An increase in lighter components may lead to fuel pump cavitation problems and vapour lock in the fuel systems, especially if fuel systems are developed to run at higher temperatures.

If the final boiling point increases but with no decrease in initial boiling point, then the overall change in fuel volatility could lead to cold start and high altitude relight problems.

- *Flash Point*

Flash point has also reduced over the years. The mean value reached its lowest point in the last 12 years in 1998, indicating its constraining influence on current production.

- *Freezing Point*

Freezing point has increased over the last two years. The trends in flash point and freezing point confirm the findings that a wider boiling range of components are being used in the production of jet fuel. This is probably due to increased demand for jet fuel and increased demand for jet fuel molecules from other fuels.

More than 32% of the jet fuel batches reported had freezing points that were near the specification limit (results that lie within the reproducibility of the method at the specification limit). This indicates that freezing point is also one of the main restraining factors in jet fuel production.

Gas-to-liquid synthesis

Worldwide long-term jet fuel demand is projected to increase by up to 5%/y. This is predicted to lead toward a 2.5mn tonne shortage of aviation kerosene in Europe alone next year. One way in which the shortfall can be made up in the medium term is through gas-to-liquid synthesis. Most of the major oil companies have processes that turn natural gas into larger hydrocarbons. Usually these chemical plants are set up in regions where the gas resource is not near to a large market, such as Shell's plant at Bintulu in Indonesia. Currently ,most of these processes produce high purity premium solvents rather than transport fuels – but if crude oil prices rise above $18–20/b it becomes more economic to use the processes to make fuels.

The first approaches have already been made to UK and US specification authorities for permission to use synthetic components in jet fuel. Some of the concerns about the performance of the product prior to approval included:

- Compatibility with elastomeric materials
- Lubricity
- Compatibility and miscibility with other fuels
- Combustion properties including impact on starting and relight performance and emissions
- Bulk physical properties including bulk modulus, specific heat, thermal conductivity, low temperature properties, viscosity, volatility characteristics, density/temperature characteristics and true vapour pressure
- Trace contaminants and controls thereof, including dissolved metals, non-metals and organic species and particulates
- Thermal stability.

Theoretically, the chemical and physical properties of this product make it, potentially, an extremely good fuel for gas turbines because:

- there is no sulfur;
- it can be produced with no aromatics;

- there are no metal contaminants;
- it has good thermal stability; and
- a wide boiling range.

Sasol in South Africa has recently been given approval to use a blend of up to 50% synthetic product with traditionally refined jet fuel for supply at Johannesburg Airport.

Effect of legislation

There have been growing concerns at the level of pollutants from automotive vehicles. Within the European Union there has been a gradual process of tightening the specifications for gasoline and diesel fuel over the past decade. This is set to continue with the latest set of directives resulting from the 'Auto Oil II' programme (see **Table**).

The interlinked nature of gasoline, diesel and jet fuel means that the forced changes in one product will have a knock-on effect in the others.

The effect of the legislation on gasoline and diesel fuels on the future quality of jet fuel is likely to be extremely complex. If legislation forces sulfur, olefin and aromatic reduction in gasoline, the effect could be to transfer some of the heavier gasoline fractions to the jet fuel. If this happens, the result will be increased sulfur and aromatics contents and reduced thermal stability if these fractions are not treated (and if no specification action is taken).

The competition from diesel for the same molecules as kerosene in the crude fraction will become intense with the legislative changes. The impact of this could be that refiners attempt to maximise jet fuel yield by blending refinery streams not normally used. For example, kerosenes from catalytic crackers and coker units have high aromatics contents, low smoke points and poor thermal oxidative stabilities. Lower smoke point fuels have lower combustion quality. Such fuels increase the potential for smoke and flame radiation in gas turbines reducing overall hot-end durability. The impact on operating costs is likely to be engine type specific. If hydroprocessing is used to improve stability, these process streams can be blended as jet fuel but generally are not because the increased yields are small compared to the effort required to maintain compliance with the limiting smoke point, aromatics and thermal stability requirements. A shortage of jet fuel could result in incentives for using these streams, with the result that the jet fuel pool would shift towards the specification limits for these properties.

Another possibility that cannot be quantified at present is how much increased pressure for the diesel and jet fuel fractions is likely to cause more jet fuel to be produced by severe hydroprocessing. In general, severe hydroprocessing improves jet fuel thermal stability. However, the pressure to maximise productivity may lead to incentives for extending catalyst life beyond present limits which could result in a degradation of thermal stability in localised situations. Another issue with severe hydroprocessing is that the produced jet fuels often have poor lubricity properties. Lubricity is often restored by blending with good lubricity fuel or by use of commercial lubricity improving additives.

The requirements for de-sulfurisation of diesel and gasoline could mean an implementation of hydrotreatment across gasoline, diesel and kerosene products with refineries making large investments. This may be inevitable if legislators decide to reduce the sulfur content of jet fuel in a similar way to gasoline and diesel. The alternative would be for the jet fuel, which currently has the highest sulfur limits, to be the product to which most of the sulfur containing molecules are directed.

Sulfur (ppm)	
1997	500
2000	350
2005	50
Distillation 95% recovery (°C)	
1997	370
2000	360
Polyaromatics (%)	
1997	–
2000	11
Cetane number	
1997	49
2000	51

Likely changes in autodiesel fuel quality

Additive technology

For airworthiness and safety reasons jet fuel has up to now remained free of most performance enhancing additives, the only currently approved ones being anti-oxidants, fuel system icing inhibitor, lubricity improvers, static dissipator and metal de-activator. (Some of these are generally used only by military equipment.)

In recent years much work has been carried out in US and UK investigating the possibility of using thermal stability enhancing additives to reduce fuel system and combustion chamber deposits. The '+100 additives', so called because they increase the thermal stability of jet fuel by approximately 100°F, have been extensively tested by the US Air Force (USAF). One particular additive is now being used in most of their jet fighter applications. The additive, which incorporates a powerful detergent/dispersant, is injected during fuel loading directly into aircraft to avoid fuel/water separation problems in bulk fuel installations. Large savings have been made in maintenance costs at the USAF units using the additive.

A UK purpose-designed additive which has been formulated to give the thermal stability enhancement without the water entrainment problems is currently being developed and has recently undergone static engine testing. This type of additive may, in the future, be used in civil applications and will allow designers of future gas turbines to utilise the increased heat sink available in the fuel to produce more powerful and more efficient propulsion systems.

Additives that affect the combustion process, reducing soot and other particulates, are also being considered.

In the near future pipeline drag reducer additives may be introduced. These additives are very high molecular weight polymers that are used in the transportation of some petroleum products down pipelines. For a given pump size, they allow more fluid to be pumped by reducing drag at the boundary layer within the pipe. Interest has been stimulated in the use of these additives because it is cheaper to use them than lay bigger pipes or put in more pumps when supply to an airport has reached its maximum. In the past, similar additives have been shown to cause thermal stability and filtration problems. It remains to be seen whether the more recently developed versions of the additive affect fuel quality.

Current trends show significant changes in distillation, freezing point and flash point, indicating an increased use of wider boiling range components in jet fuel production.

There will be many changes in the chemistry of jet fuels over the next 15 years. Some will be evolutionary and some may be step changes. Future trends in jet fuel are hard to predict and are likely to be complex. They are likely to be affected by the use of synthetic fuels, legislation (of motor fuels and possibly jet fuels), the use of additives and increased demand.

Global roll-out of IT systems for competitive advantage

Many oil companies with wide-ranging operations have attempted to rationalise the global roll-out of their information technology (IT) systems by adopting a single solution methodology. This means that whatever the country and whatever the need, many organisations believe that the same type of standard 'vanilla' IT systems can be implemented at low cost and minimal inconvenience, writes *Arif Mustafa*, Senior Consultant at CMG.*

In theory at least, this sounds ideal. A Chief Executive Officer (CEO) or IT Director often views his or her empire as a cohesive organisation, all pulling together and working in the same way. The supposed benefits of all countries using standard systems with similar procedures are clear – shorter development times, reduced maintenance costs, worldwide service level agreements (SLAs) negotiated at discounts, and uniformity of information available to top management are some of the most commonly cited reasons for global implementation.

But at the strategy phase of such an initiative, few oil company executives consider the pitfalls – of which there can be many. The crucial ones often encountered are:

- IT compatibility – the fit of the new approach with existing people and systems
- Local variation from global standards
- Which strategic partners to use
- Systems integration and implementation

This is not to say that low costs and other benefits cannot be achieved, just that their achievement is not quite as simple as it first seems.

IT compatibility

Any new global system faces two major problems. First, it will be replacing something that is currently working and that employees are used to. The need for change may well be clearly understood at corporate headquarters, but this message often fails to cascade down an organisation to grass roots level, leading to resistance. The benefits message must therefore be clear, concise and delivered at all levels.

This problem can be exacerbated when any number of countries in the implementation plan may have only recently spent time and money on other, similar, local initiatives before being compelled to implement a new system under the umbrella of a unified global strategy. Although some countries will have systems long overdue for overhaul, others will have only recently upgraded and will be reluctant to start all over again.

Secondly, the new system will have to interface with existing legacy systems. The complexity and problems

IP THE INSTITUTE OF PETROLEUM

HAVE YOU TAKEN UP THE MEMBERSHIP CHALLENGE YET?

Individual Members continue to join the Institute of Petroleum despite the ongoing downsizing of the oil and gas industry. 1999 was our tenth continuous year of growth.

For the third year running, British Airways has agreed to act as the official sponsor to our winter competition. BA will donate two business class return tickets from London for any destination, to the IP Member who recruits the most new members between 1st October 1999 and 31st August 2000.

This year we want as many members as possible to take up the "Challenge", so each member that recruits a new Member will receive a prize or prizes:

Recruit 1 or 2 new members	=	IP pocket diary bound in Navy kid grain leather
Recruit 3-6 new members	=	IP tie in either navy or burgundy silk or equivalent
Recruit 7-9 new members	=	Theatre Ticket voucher worth £30.00
Recruit 10 or more new members	=	Two Eurostar Tickets to Paris or Brussels

Who would you propose?

We believe that our current Members are the best people to recruit new Members and the statistics would seem to prove us right. Over 50% of the IP's Individual Members stated that they joined on the personal recommendation of an existing member.

So it's probably a good time for you to do the same favour that someone did for you and share the benefits of the IP with a colleague or a friend? And now is an excellent time for anyone to consider joining the IP – all new members are entitled to:

- ★ Use of the suffix **M Inst Pet** after your name
- ★ Receive a free monthly copy of **Petroleum Review** magazine
- ★ Join any of our specialist **Discussion Groups** or become involved in the **Branches** network
- ★ Obtain **discounts** on attending IP conferences, seminars or training courses
- ★ Obtain a **free** entry in our Consultants Handbook – published on the IP's award winning website
- ★ Gain **free** access to our Library
- ★ Obtain **discounts** for on-line searches using a variety of databases from our Information Service
- ★ Receive a **free** copy of our Lifetime Learning Workbook and Plan
- ★ Gain the opportunity to establish **new contacts** through discussion groups and branch meetings
- ★ Obtain access to the IP's **website** including areas restricted to Members when you click on www.petroleum.co.uk

ABOUT YOU & YOUR INTERESTS

1 HOW WERE YOU INTRODUCED TO THE IP? (PLEASE TICK ONE BOX ONLY)

- ❑ Personal recommendation
- ❑ Company requirement
- ❑ Via library/information services
- ❑ Via IP conferences/meetings
- ❑ Via IP's technical work
- ❑ Via *Petroleum Review*
- ❑ Via Internet
- ❑ By the IP contacting me

2 ACADEMIC OR PROFESSIONAL QUALIFICATIONS AND SUBJECTS (HIGHER FIRST)

Qualification	College/University	Year	Subject

MEMBERSHIP OF PROFESSIONAL BODIES (EG INSTITUTION OF MECHANICAL ENGINEERS)

Professional Body	Grade of Membership	Chartered Status (eg CEng)

3 EMPLOYMENT STATUS

❑ Employed ❑ Self-employed ❑ Retired ❑ Student ❑ Other

4 TYPE OF ORGANISATION BY WHICH YOU ARE CURRENTLY, OR WERE MOST RECENTLY, EMPLOYED

(PLEASE TICK ONE BOX ONLY)

- 00 ❑ Major international integrated oil company
- 01 ❑ Other integrated oil company
- 02 ❑ Independent oil company upstream
- 03 ❑ Independent oil company downstream
- 04 ❑ Supply/distribution/storage
- 05 ❑ Other energy industry (gas/coal etc)
- 06 ❑ Eng. contractors/manufacturers/suppliers of equip.
- 07 ❑ Shipping
- 08 ❑ E&P services
- 09 ❑ Inspection/laboratory service company
- 10 ❑ Chemical/additive company
- 11 ❑ Transport industry & retail services
- 12 ❑ Information technology/computing/publishing
- 13 ❑ Traders/brokers
- 14 ❑ Investment/finance/banking/legal
- 15 ❑ Educational/training establishment
- 16 ❑ Government/military/local authority
- 17 ❑ Consultancy
- 18 ❑ Industry association
- 19 ❑ Research establishment
- 20 ❑ Geophysical/seismic company
- 21 ❑ Aviation
- 22 ❑ Other (please specify) _____

5 JOB FUNCTION (PLEASE TICK MAXIMUM OF 2 FUNCTIONS WHICH BEST DESCRIBE YOUR CURRENT OR MOST RECENT JOB)

- 00 ❑ Director/general manager
- 01 ❑ Planning/economics/project management
- 02 ❑ Financial/computer services/information technology
- 03 ❑ Personnel/industrial relations/training
- 04 ❑ Administration/legal/public affairs
- 05 ❑ Product & process research & development
- 06 ❑ Exploration & geophysical
- 07 ❑ E&P services/offshore support/subsea
- 08 ❑ Drilling & production
- 09 ❑ Supply & trading
- 10 ❑ Transport/pipelines/shipping
- 11 ❑ Refining/manufacturing
- 12 ❑ Marketing/sales/distribution
- 13 ❑ Product quality/analysis/testing/measurement
- 14 ❑ Engineering/design/construction
- 15 ❑ Medical/health & safety
- 16 ❑ Environment
- 17 ❑ Academic
- 18 ❑ Gas
- 19 ❑ Media/publications
- 20 ❑ Storage
- 21 ❑ Microbiology
- 22 ❑ Loss control
- 23 ❑ Retail
- 24 ❑ Inspection
- 25 ❑ Lubricants
- 26 ❑ Petrochemical
- 27 ❑ Library/information services
- 28 ❑ Other (please specify) _____

6 INTERESTS PLEASE INDICATE, USING THE CODE NUMBERS IN '5' ABOVE, THE THREE SUBJECT AREAS WHICH MOST INTEREST YOU:

❑ ❑ ❑

7 IS/WAS YOUR WORK PRIMARILY:

❑ Upstream? ❑ Downstream? ❑ Both?

DATA PROTECTION ACT 1984

Any information provided by you may be held by the IP in its computer records. Please tick the box if you do not want to receive details of products or services from other organisations with whom we may associate. ❑

PERSONAL DETAILS

Surname

First Name(s)

Mr/Mrs/Miss/Ms/Dr etc

Date of Birth

Home address

Postcode

Country

Telephone

Fax

E-mail

Job Title

Name of Company

Company Address

Postcode

Country

Direct Telephone

Direct Fax

E-mail

Preferred mailing address ❑ home ❑ business

PAYMENT

Applications for the year commencing 1st January 2000 must be accompanied by payment, as follows:

Applicants of 25 years of age or more – £60.00

Applicants of under 25 years of age – £10.00

DIRECT DEBIT

INSTRUCTION TO YOUR BANK/BUILDING SOCIETY TO PAY DIRECT DEBITS

DIRECT Debit

1. Name and full postal address of your Bank or Building Society

To The Manager

Bank or Building Society

Address

2. Name of Account Holder

3. Branch Sort Code
(from the top right hand corner of your cheque)

❑❑ ❑❑ ❑❑

Banks/Building Societies may refuse to accept to pay Direct Debits from some types of account

Originator's Identification Number

9 9 2 5 6 7

4. Bank or Building Society account number

❑❑ ❑❑ ❑❑ ❑❑

5. Instruction to your Bank or Building Society
Please pay The Institute of Petroleum Direct Debits from the account detailed on this instruction subject to the safeguards assured by the Direct Debit guarantee

Signature(s)

Date

Do not forget to sign your application overleaf

You require a proposer who is an IP Member, or, if you do not know one, a letter of recommendation from someone who knows you professionally

PROPOSER

I, being an individual member of the Institute of Petroleum (membership number .....) or nominated representative of a collective member (company name .....) and having known the candidate personally for ..... years, propose and recommend him/her in accordance with the By-Laws as a fit and proper person to belong to the Institute.

Signature: _____

Date: _____ Name: _____

APPLICANT

I, the undersigned, declare that the statements made herein are correct to the best of my knowledge and belief. I agree, if admitted to membership, to be governed by the rules and regulations of the Institute of Petroleum as they now exist and as they may hereinafter be altered. I agree that the information given on this form may be held at the IP and its branches and that my name may be published in *Petroleum Review*.

Signature: _____

Date: _____

OTHER METHODS OF PAYMENT

CREDIT CARD

Please debit the sum of £_____ to my: Diners Club ❑ Eurocard ❑ Mastercard ❑ Visa ❑
Switch ❑ Issue number ❑

CARD NO: ❑❑❑❑ ❑❑❑❑ ❑❑❑❑ ❑❑❑❑ Expiry date: _____

Card Holder's Name: _____ Card Holder's Signature: _____

Registered Address: _____

_____

CHEQUE

Please make cheques payable to 'The Institute of Petroleum'. If you have no bank account in the UK, please pay by sterling bank draft drawn on a London bank. Please do not send cheques drawn on a bank outside the UK, as bank charges can be as high as £25.00.

associated with this are significant. For example, different countries will have a variety of technologies, regulatory requirements and working environments. Whatever global solution is proposed, it will have to interface with all these environments.

Local differences

A further challenge is that ground-level working practices between regions are often very different. Countries always have different methods of operation and will continue to do so. This is no accident – they have grown in that way in order to accommodate their individual market characteristics. These differences that accommodate local flavour are essential, allowing multinationals to fit into their regional marketplace. If, during roll-out of new systems, they are stifled in an attempt to localise their operations, there is a danger that the multinational will lose the specific features needed in that market, and therefore its ability to compete and defend market share.

Another common problem that is often overlooked is the difficulty of dealing with local differences at a product development level. All global implementations have local variation: different tax laws, pricing strategies and product profiles. Any global solution will therefore require the technology to deal with such changes and the flexibility in procedures to permit the ability to operate differently at a regional level. For example, in a retail environment some countries offer cash back on card transactions – any global solution that fails to take this into consideration will have a significant negative impact on trade, as business will go elsewhere.

In order to anticipate such problems, when taking a base product and implementing it internationally, organisations must identify local differences between original and planned solutions. At this stage the benefit of controlling what the 'vanilla' version can or cannot do will come to light. Ideally, a core project office, supplemented by regional support, must control this process. By coordinating the activity from a hub, benefits from bespoke developments in one region can be fed back and used elsewhere in the project. This can be of particular advantage when adapting to regulatory changes using varying lead times. Smart organisations can adapt a system to accommodate a new working practice in one country and then use this to influence change in another.

Another key role a central project office will have is arbitrating between local companies and head office on what can change and what must remain the same in the new system. This must be clear and backed up by senior management, as regional managers well versed in the politics of dealing with head office service operations may have their own agendas.

Implementation

Once a system has been developed, an organisation's attention is focused on delivering a project. In order for a global implementation to succeed, the pilot must be seen to be successful and to be well managed – anything mediocre will be considered a failure. This is no mean feat as a pilot project in a global implementation can mean a whole country.

Assume that future recipients of the system in the company will want to know how the pilot is progressing. If information output is poorly managed, control over what is disseminated will be lost and adverse criticism will thrive. While there is nothing wrong with constructive criticism – indeed that is one of the reasons for undertaking a pilot – it must not reach the point where it creates resistance for future roll-out unless such resistance is well-founded.

In addition, a great deal of thought has to be given to where the pilot will take place. Think carefully. It may not always be best to trial in countries that are the obvious choice. For example, better-developed countries often have the latest technology and are less likely to surrender their own working practices for the sake of a global initiative; hence there could be more resistance to change. Less developed countries, on the other hand, are more used to dealing with problems associated with being remote. Commonly they are left to their own devices to get things working, which they are often successful in achieving.

Strategic partners

The core business of an oil company is not about rolling out new systems. Any oil company embarking on a global systems roll-out has to find the right strategic partner and, more importantly, define the right relationship with it. Finding a vendor with a global presence able to tackle a worldwide roll-out is not easy. There are not that many of them, especially if they are required to write the software, provide hardware, execute the systems integration and manage the project. When one is found, its coverage may not be comprehensive throughout the world and it may outsource to third-party companies to complete work.

A word of caution

Margins in the oil industry are tight – recent drops in oil prices having adversely affected profitability. Advantages gained by using a global strategy are often offered as a panacea to remaining competitive. Any company embarking on such an initiative should understand, however, that while the complexities surrounding any type of local roll-out are difficult enough, in the global arena, problems are often worse.

Time spent on a thorough cost-benefits analysis and, in particular, gaining an understanding of the system integration and programme management issues is time well spent. Often benefits from a unified system fail to materialise because the complexity and variation at a local level outweigh any advantages offered. Eventual costs can result in being similar but, due to conformity, the system can be sub-optimal. And making it bespoke to country requirements can be slow.

Multinationals have found that the key to success in systems integration is selecting the right partners. Oil companies have often fallen into the trap, however, of thinking one huge company plus another guarantees success. There is also an increased risk as going with one company offers no contingency. Impartiality is also compromised, as a single company may not offer best-of-breed solutions.

An alternative to the global partner route is using smaller vendors in specific market regions. This has some benefits over the one vendor, one strategy approach. Regional operating companies already deal with preferred local partners with whom they have a history.

Instead of severing ties, some multinationals are rethinking their global strategy, encompassing key regional companies who add value to their organisations. Global systems implementation is a huge, difficult task – the trick is dividing work into logical segments and controlling their integration. Globalisation of systems can deliver the benefits claimed but it is far from simple to achieve and demands a much greater understanding and control than is usual.

**European IT services group CMG provides business information solutions through consultancy, systems development, software applications and managed services.*

Powering up for an alternative fuelling future

For a number of years alternatives to conventional fuels were only of background interest – but this dramatically changed as a direct result of the first fuel crisis in 1973. Subsequent progress in developing alternative fuels has been steady, rather than spectacular. However, momentum over the past two years has built rapidly. Fuel technologist *Eric Goodger* reviews the proceedings of a recent conference on the infrastructure and strategic decisions that will be necessary for the production of alternative fuels in commercial quantities.

The calling of a conference on 'Power Supply Infrastructure for Alternative Fuel Vehicles' – held in London on 18–19 August this year – indicates that this topic has graduated to an acceptable level of respectability, if not urgency. In fact, the upbeat message is that alternative fuels have already moved from demonstration to commercialisation.

The event brought together 17 speakers and 44 delegates from the automobile, petroleum and utility industries, government bodies, city transport organisations and environmental consultancies, plus representatives from associated bodies and academia. Although largely UK in flavour, there were significant inputs from the US and Germany.

Why alternative fuels?

The speakers first addressed the benefits that could arise from the use of alternative fuels versus conventional ones. These can be summarised as follows:

- Cost savings – operating costs can be reduced due to the more favourable excise duties currently levied by governments on alternative fuels compared with conventional fuels. While the level of lower levies on alternative fuels is beginning to reduce, that placed on conventional fuels continues to rise.
- Environmental benefits – A number of environmental benefits are offered through the use of alternative fuels, both in terms of air quality and global warming as well as noise pollution. It was pointed out that:
  - in the UK, a growing 22% of CO_2 emissions arise from transport;
  - many European cities will fail to meet the Auto Oil II emissions targets for year 2005;
  - poor air quality has been judged a bigger health problem than car crashes, with 24,000 premature deaths per year and with asthma in children almost doubling within a decade; and
  - combustion in gas-powered engines is quieter than in diesels.
- Safety – fuel tanks designed for use with alternative fuels are better able to withstand impact, while the effects of vehicle fires are reduced.

The disadvantages of alternative fuel usage at present include vehicle costs and limited infrastructure. It is also recognised that despite the 100 years or so of development history applying to conventional engines, improvements still continue. Indeed, in this context, one speaker was prompted to question whether alternative fuels actually represented a solution looking for a problem! The need to assess all fuels on a well-to-wheel basis – including emissions associated with energy production – was emphasised throughout the conference.

Government support

Developments within the alternative fuel scene have been supported, and in a number of cases initiated, by the UK government. For example, it has:

- introduced fiscal measures via differential taxation and excise duty concessions based on factors such as engine size and emission levels;
- funded, since 1996, the Energy Savings Trust's 'Powershift' programme which offers grants towards the purchase of alternative-fuelled vehicles; and
- established in 1998 the Cleaner Vehicles Task Force to identify and promote the sales of environmentally friendly vehicles.

Alternative options

Over the years, the candidate alternative fuels have become categorised under the headings of:

Supplemental – conventional type fuels derived from non-petroleum sources such as gases, coals and biomatter; and

Substitute – liquefied or compressed gases, oxygenates (alcohols, ethers), nitrogen hydrides (ammonia, hydrazine), CHON compounds (nitromethane) and hydrogen itself.

Propulsive systems alternative to conventional heat engines are also under active development in terms of electric motors powered by either storage batteries or fuel cells. Although some of these fuels and systems have the potential to meet the needs of certain niche markets, the message that emerged clearly from this conference is that, for the near future, liquefied petroleum gas (LPG) is optimal for cars and other light vehicles, and compressed natural gas (CNG) for heavy trucks.

Going down the LPG route

LPG comprises butane (C_4H_{10}) spiked with propane (C_3H_8) and, as its name implies, is derived as a by-product from oil refineries. However, its main source in the UK is natural gas, the major component of which is methane (CH_4). In comparison with conventional petroleum-derived petrol and diesel, these gases are relatively rich in highly energetic, clean-burning hydrogen, and relatively low in potentially polluting carbon.

The rapid changeover from low- to ultra-low sulfur diesel fuel has proved to

offer a good short-term solution for reducing smoke and particulates but will not solve the problem of NOx emissions in the longer term. Therefore, in order to develop its low carbon-intensity gas business, ShellGAS has opted for LPG as a diesel replacement for centrally-fuelled city fleets where air quality is of paramount importance. Such a policy is based on the results of reduced emissions of particulates, NOx and hydrocarbons including the ozone precursors obtained from engines tested on the Euro cycle at the Millbrook test centre. This reflects the quote from the University of California that: 'LPG from natural gas appears to have the lowest life-cycle emissions of urban air pollutants and greenhouse gases'.

Safety issue

The question of safety was addressed by illustration of an LPG tank retaining its pressure successfully after extreme impact, together with pressure relief by pulsed venting rather than eventual explosion during a car fire test. The Millbrook tests using a range of Vauxhall cars also showed that, even though fuel consumption with LPG was higher than that with a direct injection diesel engine of comparable size, the running costs were lower in view of the price differential. Ford also reported on its long-term commitment to alternative fuelled vehicles, as well as recycling generally, concluding that we can have 'any colour we like as long as its green'.

Vehicle fuelling with LPG was demonstrated to be no more difficult than with conventional fuels – it has already reached self-service status in Europe – although some adjustments have to be made for the additional volume and weight of LPG tanks for a given vehicle range. It is expected that, in the UK within the next two years, nine vehicle manufacturers will be offering 'MotorGas' models (4mn such vehicles already operate worldwide), and that the number of LPG retail outlets will exceed 250.

Dual fuel approach

A case study of adoption of LPG by a local authority was outlined by the City and County of Swansea Council which has opted for a dual fuel approach with gasoline for 40 of its 694-strong fleet of vehicles. Data is being collected on emissions and fuel consumption for subsequent analysis.

Local authorities, in fact, emerge as the largest purchasers of alternative fuel vehicles according to data from the Energy Savings Trust, who also confirm CNG as the greatest attraction for depot-based fleets of trucks and buses. The reduced noise of CNG-fuelled engines is confirmed by the permission granted for large trucks to deliver within London during night hours.

Automated fuelling

An interesting sidelight focused on the automatic refuelling of vehicles by robots. A transponder card behind the vehicle windscreen provides the robot with the required data of the vehicle type and hence the location of the filler cap in relation to the rear wheel housing. A laser scanner with associated software and a camera determines the position of the tank flap, which is then opened by means of a sucker. The robot returns to the front of the filler cap and opens it by rotating it through 90°. The nozzle then enters and delivers the fuel, closing both the cap and flap afterwards. The system incorporates vapour recovery.

With most fuels, the driver is free to leave the car at any time by pushing the robot aside, but with liquid hydrogen fuel, the safest position in the unlikely event of any fuelling problem is considered to be within the car itself!

Biofuels and batteries

According to the speakers, biofuelled vehicles, although considered viable at present, may be eliminated by year 2005 due to catalyst problems. On the electrical propulsion scene, modest breakthroughs only were reported in battery technology, but successful case studies were outlined.

The first concerned the design and installation for a London resident of a roadside charging unit. This comprised an aluminium housing incorporating a 15 amp power outlet, a meter and various safety devices situated 45 cm from the kerb at a specially dedicated parking bay. The connection cable is carried in the car, and is connected to the housing via a pavement duct which is normally covered when not in use. The largest project of this type in UK provides for a dozen cars in the City of Coventry.

Some fairly full reports were given of the various electric buses that have been employed successfully over the last eight years in the fleet of the Santa Barbara Metropolitan Transit District. The 18 vehicles involved comprise six battery variants, four battery management systems, eight battery charger variants, and numerous AC and DC powertrain systems.

Advantages of electric traction were confirmed as clean, quiet, odourless, emission free, cheaper fuels and reduced reliance on imported petroleum. Potential limitations include vehicle range, duration, speed, gradability, capacity and overall costs. Studies included fast charging, battery swapping and hybrid vehicles. Another interesting feature of this project is that the American culture tends to view passengers on conventional buses as 'losers' – lost their licences, bankrupt, unable to drive etc. The fact that the ridership on electric-powered buses actually increased substantially, with some passengers preferring to await an electric bus rather than board an available diesel bus, could be seen as positive proof of success.

Fuel cells

Fuel cell developments were also reported, with the preference being for hydrogen as a fuel rather than hydrocarbon plus an onboard reformer of only 25% to 40% efficiency. The Anuvu fuel system, which is based on oxygen itself as the oxidant rather than atmospheric air with associated compressor noise, was shown to enable a reduction to half the size of the proton exchange membrane fuel cell which operates at 60°C. The energy conversion efficiency is estimated as 50% in comparison with 18% for an internal combustion engine. A vehicle top speed of 75 mph and range of 300 miles is achievable. Refuelling should occupy less than five minutes.

One of the widely significant factors which would eliminate the challenging problems of bulk hydrogen distribution is for power utilities to sell off-peak and night-time electricity to fuel stations where both hydrogen and oxygen would be generated by electrolysis, and stored for direct sale to customers on the forecourt. This system is reputed to require the least amount of vehicle complexity than that of any other fuel cell option.

With regard to safety, hydrogen vents rapidly upwards and burns with a non-radiating flame which would not involve neighbouring materials unduly, whereas the oxygen tank is jacketed with a chilling fluid to reduce the oxygen concentration rapidly to 30% in the event of rupture.

Other presentations included an outline of the Millbrook testing facilities and ongoing projects, and a review of investment for public alternative power supply infrastructure.

The final message

A range of interesting and informative presentations were made to the delegates and the upbeat nature of the conference can be encapsulated by the statement that the fuels discussed may no longer be considered as alternatives but as currently available options.

Copies of the conference proceedings are available from Access Conferences International, 22–6 Albert Embankment, London SE1 7TJ, UK, priced £295.

New storm over US reformulated gasoline

The US Environmental Protection Agency (EPA) has announced that it will take measures to substantially reduce the use in reformulated gasolines of the oxygenate methyl tertiary butyl ether (MTBE) which has been found to be polluting groundwater in California and elsewhere. This change of policy followed a report by an EPA advisory panel on oxygenates in fuels which concluded that while the amounts of MTBE currently in water sources did not pose a health concern, higher levels of concentration might. *Judith Gurney* reports.

The EPA decision reflects the influence of California in environmental affairs. Last April, Governor Gray Davis issued an executive order banning the use of MTBE in gasoline sold in California by the end of 2002, and requested the EPA to grant the state a waiver from federal oxygenate requirements for reformulated gasolines. The California Air Resources Board (CARB) and the state energy commission subsequently set a timetable for the gradual phase-out of MTBE to give refiners time to retrofit their plants to produce gasolines which would meet air quality standards without containing MTBE. Refinery modifications will involve significant amounts of capital.

The MTBE question

MTBE is added to some of the motor vehicle fuels sold in all or part of the 16 states where reformulated gasoline use is mandated by the EPA, as well as in Arizona, which purchases its gasoline from California refiners (see map). Concerns about its health effects have been voiced in a number of these states and attempts made to ban its use.

Although MTBE has been shown to induce cancer in rats in high doses, no studies to date have indicated that its consumption presents a health risk to humans. But the distinctive odour and taste of MTBE makes it detectable in water even at very low concentrations and there is ample evidence of its presence in many drinking water sources, presumably as the result of leaks in underground storage tanks at service stations and pipelines. It is present in a number of California reservoirs and other underground water sites as well as in lakes used for recreational purposes – apparently, in the latter instance, as a result of unburned fuel in the exhausts of two-stroke outboard boat engines and jet skis.

Gasoline additives

The principal characteristics that determine the performance of a gasoline in internal combustion engines are volatility and octane number. Additives are required in order to produce effective fuels. The fuel must have a minimum level of vapour pressure, measured in terms of Reid Vapour Pressure (RVP), in order to be volatile and therefore easily combustible. In addition, the fuel must contain a sufficient level of octane to prevent spontaneous detonation, or 'knocking', and power loss. Blending of additives to achieve these goals is generally done at major refining centres, but it can sometimes be done in storage tanks or in pipelines.

In the past, lead compounds were added to enhance the octane rating of gasolines. However, the lead content of motor fuels was phased-out in the US for environmental reasons, and MTBE was one of the additives chosen as an alternative to boosting octane ratings.

Reformulated gasoline

The elimination of lead also resulted in an increase in concentrations of benzene and aromatics in gasoline emissions, and it was the presence of these toxic substances that led to the enactment of the US Clean Air Act Amendments in 1990. This legislation called for the gradual introduction of reformulated gasoline (RFG) in areas which the EPA considered to have unacceptable air quality – the so-called air quality nonattainment areas.

EPA specifications for RFGs were complex formulas based on assumptions regarding the effect of various constituents of motor fuels on air quality. Aiming to reduce smog and ozone levels, it required reformulated gasolines to have vapour pressures within a given range and low concentrations of volatile organic compounds (VOCs), olefins and toxic emissions compared to conventional gasolines sold in 1990. Phase 1 of the EPA programme began in 1995, with more stringent requirements due to take effect in Phase II beginning in 2000. It allows refiners to come up with their own solutions to meet these specifications, and sets complex performance standards to measure their success in so doing.

In addition, in order to reduce carbon monoxide emissions, the EPA required gasolines sold in nonattainment areas, beginning in late 1992, to contain a minimum weight of oxygen in the form of oxygenates such as MTBE and ethanol.

The MTBE option

MTBE seemed an ideal oxygenate additive in the mid-1990s. It raised octane levels, increased volatility and

US states (shaded) where the environmental protection agency (EPA) requires the sale of reformulated gasoline (RFG)

diluted the final mixture, thereby reducing the concentration of objectionable compounds such as benzene, aromatics and sulfur-bearing compounds. Its presence in ground water was acknowledged, but defendants of its use argued that this could be corrected by upgrades of underground gasoline storage tanks and pipelines and restrictions regarding the use of recreational vehicles on lakes.

By 1999, the manufacture of MTBE by oil companies and others reached 269,000 b/d. It was estimated to be a multibillion dollar industry involving not only domestic producers but also foreign manufacturers in Saudi Arabia, Canada, Dubai and Venezuela.

Conditions in California

Although MTBE-blended gasoline was a low-cost fuel option in California, the largest gasoline market in the US, there were problems with its use. Because of severe air quality problems – especially in the southern part of the state, resulting from a combination of geography and a heavy motor vehicle presence – California has its own, stricter emissions standards, administered by the California Air Resources Board (CARB). As a result, gasoline used in California is subject to both EPA and CARB regulations – gasoline sold anywhere in the state must meet CARB standards while that sold in the EPA nonattainment areas of Los Angeles and San Diego must also meet EPA specifications.

One important difference in these regulations is that of oxygen content. The EPA mandates a minimum oxygen content of 1.8% per weight which corresponds to an MTBE concentration of about 11% volume. CARB does not require any minimum oxygen content in summer gas but imposes a 2.7% per weight limit on the grounds that high oxygen content is associated with increased nitrogen oxide emissions, especially in summer.

Possible MTBE substitutes

If MTBE use is restricted and subsequently banned in California – and perhaps, later, nationwide – specifications for reformulated gasoline could theoretically be met by substituting ethanol or other, less well-known oxygenates for MTBE or, theoretically, without the use of any oxygenates. None of these options, however, are easy or cheap – particularly in California.

Ethanol, which is produced mainly from the fermentation of grains although it can be manufactured synthetically by ethylene hydration, is considered by many as the best MTBE substitute. But because ethanol is highly volatile and increases gasoline evaporation, especially in summer which can result in larger amounts of smog-forming emissions, the EPA issued a rule in 1991 forbidding its use in reformulated gasolines.

A politically powerful lobby of Midwest grain farmers was able to persuade President Bush in the heat of the 1992 elections to issue a waiver for this ruling and Congress to enact subsidies for ethanol feedstocks so that ethanol was competitive in price with MTBE, at least in some areas. The fact that there will be another major election in 2000 suggests that ethanol will continue to have support in Washington.

Substituting ethanol for MTBE in the Californian market, however, would be difficult. As it has a strong affinity for water, ethanol shipment from Midwest producers and storage in California would present major problems. And while MTBE, produced by reacting isobutylene with methanol, could be added at the refinery level, ethanol requires a different blending system later in the process.

The other oxygenates which could function as MTBE substitutes include tertiary amyl methyl ether (TAME), ethyl tertiary butyl ether (ETBE), di-isopropyl ether (DIBE) and tertiary-butyl alcohol (TBA). But it would be difficult to guarantee an adequate supply of any of these, and most have unknown toxicology.

Are oxygenates necessary?

A ground swell of support for doing away altogether with oxygenates in reformulated gasolines has arisen after the publication of a report on

oxygenates by a National Research Council (NRC) panel in May. The NRC study resulted from a request by a Midwest Senator who expected that such a study would show the superiority of ethanol over MTBE. Ironically, the NRC panel concluded that the use of both ethanol and MTBE in reformulated gasoline contributed little to reducing ozone, a major component of smog. And it noted that the small current potential for oxygenates to lower smog levels would decrease as other measures to reduce vehicle emissions of toxic substances took effect.

The NRC panel criticised the EPA for its certification of reformulated gasolines by measuring the total mass of volatile compounds that they emitted and failing to examine the potential for these compounds to form ozone. It suggested that carbon monoxide emissions should also be measured as these could be a significant factor in ozone formation. And finally, in an added blow to ethanol supporters, it noted that because ethanol-blended gasoline is more volatile, it is difficult for such blends to meet EPA standards unless the ethanol is blended with a more expensive, lower-volatility gasoline that is not readily available in many markets. An earlier study sponsored jointly by the automotive and oil industries also expressed similar doubts about the ozone-related advantages of adding oxygen to gasoline.

Sulfur emissions

As the NRC panel noted, both the oil and automobile industries are heavily involved in meeting EPA air quality requirements. That they are sometimes at cross purposes is evident in the current debate on the sulfur content of gasolines.

The automotive industry uses catalytic converters to control the emissions of hydrocarbons, carbon monoxide and nitrogen oxide from motor vehicles, and its success in this is monitored by mandatory periodic tests of motor vehicle tailpipe emissions. Sulfur, which is present in various amounts in crude oils and gasolines, lowers the efficiency of catalytic converters. The EPA's upcoming, more stringent standards for vehicle tailpipe emissions will require an increase in the efficiency of catalytic converters. The automotive industry says that this will be difficult to accomplish with gasolines containing sulfur.

The EPA has responded to this complaint by a proposed rule, expected to be final by year-end, calling for a 90% cut in US gasoline sulfur levels nationwide by the year 2004. The oil industry has reacted angrily to this rule, arguing that reduction should be required only in areas of the country where it will make a difference in air quality, and not nationwide.

The future for RFG

The value and content of reformulated gasolines has been a politically contentious issue since the late 1980s, and the issue will undoubtedly continue to be disputed by members of the oil and motor vehicle industries, environmental activists, exporters of crude oil and petroleum products to the US and producers of additives.

There is ample evidence that the use of reformulated gasolines, in combination with the introduction of catalytic converters and other measures, has improved US air quality overall. The NRC panel noted that peak ozone pollution levels fell by about 10% in many metropolitan areas between 1986 and 1997. But, unlike catalytic converters, the value of reformulated gasolines is clouded by many unknowns regarding the effects of emissions from their basic components – and of those from the additives intended to counteract these emissions – on the environment.

Environmental management systems – why certify?

Certification of a company's environmental management system to an international standard – ISO 14001 or EMAS – is a growing trend among both operators and contractors in the oil and gas industry, writes *Lucia Susani,* Director, Ambiente Ltd.*

External recognition of environmental performance is the motivation for most, if not all of the companies who have opted for certification – achieving the standard presents clear evidence to clients, the public, and the legislative authorities of a company's environmental commitment.

ISO 14001, Environmental Mangement Systems – Specification with Guidance for Use, was released in 1996 by the International Standards Organisation (ISO), replacing the pioneering BS 7750 developed by the British Standards Institution (BSI). EMAS, the European Eco-Management and Audit Scheme, was issued by the European Council in 1995. Both ISO 14001 and EMAS specify the elements of an effective environmental management system, aimed at achieving environmental and economic goals. Organisations following the dictates of these models can obtain external certification (for ISO 14001) or verification (for EMAS) of their environmental performance. To date, the number of ISO 14001-certified companies is still small – 70 worldwide in the oil and gas sector – and EMAS is even less widespread, but the impetus is growing.

In the UK, a handful of companies have already obtained ISO 14001 certification. The first was Amerada Hess in December 1997. 'We wanted something that would clearly indicate to our potential partners our environmental commitment and responsibility,' explains Eddie Cameron, HS&E Manager at Amerada Hess. BP Amoco and Shell are two other operators who are currently bringing all of their assets worldwide to ISO 14001 certification. 'Achieving certification is a way to prove to the outside world that the company has a good HS&E Management system,' says Peter Flynn of BP Amoco, responsible for monitoring ISO 14001 achievement among the group's upstream assets. Steve Turner, coordinating certification for Shell UK, explains that the motivation was driven by 'public relations, and a desire to improve the company's reputation'.

Among contractors, Amec Process and Energy, as well as Kvaerner Oil and Gas, have already reached certification at all of their sites in the UK, as has the fabrication company Barmac. 'We are concerned about environmental issues and wanted to demonstrate that we are taking them seriously,' says Crawford Lochhead, Barmac's QSE Manager. Similarly, certification at Kvaerner Oil and Gas was driven both by business considerations – as a way to differentiate the company from competitors – and as a means of providing an 'increased level of environmental assurance to both stakeholders and customers', says Bob Lauder, HSEQ Vice President.

The ISO 14001 approach – plan, do, check – reflects that of its near cousin, the quality standard ISO 9001. To comply, an organisation must first identify the environmental aspects of its activities, along with the applicable environmental legislation. Based on this information, the organisation must put forward quantifiable environmental objectives and targets aimed at environmental improvement. Training, documentation, monitoring and auditing are used to ensure that the system is robust.

The EMAS approach, though popular in mainland Europe, has not caught as much attention in the UK with only a few companies in the oil and gas sector having chosen to seek EMAS verification to date. The scheme's requirements are similar to those of ISO 14001, although more prescriptive. In addition, companies opting for EMAS must prepare an Environmental Report. Some of BP Amoco's assets, such as the Andrew platform in the North Sea, and Shell Expro's gas plants at Fife, Bacton and St Fergus, have achieved both EMAS and ISO 14001.

Keys to success

Opting for certification to either standard requires time, money and effort, but has unfailingly been shown to provide benefits. By reviewing the experience of some ISO 14001-certified companies, clear characteristics and requirements for success are highlighted.

Full commitment from top management is a must, to ensure that the necessary authority and willpower exist to drive the effort. This is a universal feeling among companies who have

gone through the certification process. 'It's the only way to get things done,' warns Deborah McBeath, Corporate Environmental Advisor at Kvaerner Oil and Gas.

A dedicated budget is another requirement, as certification does not necessarily come cheap. 'It's a lot of money,' was Eddie Cameron's assessment at Amerada Hess, 'and the capital costs of implementation are ongoing, as part of our improvement programmes'. Bob Lauder of Kvaerner Oil and Gas commented that: 'It's important that you recognise up front that there will be a development cost, but personnel involvement and time should become business as usual. Environmental activities should be an integral part of everyday work.'

Environmental awareness

The cost and time for certification will depend on a company's level of environmental awareness. In most cases, operators will find that many of the requirements of ISO 14001 are already addressed by existing in-house procedures, or by an ISO 9001-certified Quality Management System. For example, Shell's corporate Environmental Management System 'already had all of the processes in place', says Steve Turner, 'and only required the appropriate paperwork and audit trail to formalise the system'.

A 12-month timeframe to certification is typical. It was the period needed by Amerada Hess' fast-track approach to ISO 14001, and was required by both Barmac and Kvaerner Oil and Gas to achieve certification. According to Peter Flynn of BP Amoco, the optimal timescale is between 'ten to fifteen months'. This period allows for the system's assimilation into an asset's (or a company's) organisation, structure and activities. If the process occurs too slowly, momentum may be lost. As Steve Turner at Shell recommends: 'Go for it quickly – get everything prepared, then go for a big splash'. His concern is that it can otherwise be difficult to maintain a high level of interest and involvement by personnel for an extended time period.

Consultant *vs* 'DIY' approach

Many companies have chosen to use consultants to drive development and implementation of their environmental management systems. This may be an important consideration, especially if time and resources are limited. Eddie Cameron at Amerada Hess states: 'We could never have achieved certification within our aggressive

One of the posters used at Kvaerner Oil and Gas Ltd to raise environmental awareness

time scale without external help'.

There are, however, advantages to the 'DIY' approach. 'If you go through the regulations yourself, you will become better aware of the requirements, and once you are up to speed, you will know as much as the consultant', Steve Turner at Shell emphasises. 'It all depends on getting the right consultant', says Deborah McBeath at Kvaerner Oil and Gas. 'They should not just do the paperwork, they've got to be there with the staff.' Ultimately, the system must be understood, and operated, by people internal to the company.

Employee support

Employee contribution and participation can be the most difficult aspect of implementing an environmental management system. 'Until personnel understand what they are signing up to, it will be difficult to get them to buy into the system,' states Bob Lauder of Kvaerner. 'Enthusiasm has to be engendered through education.' This issue can be a concern both during initial certification, and during subsequent upkeep of the system. 'Getting continual involvement from staff, and keeping up the enthusiasm, can be difficult', continues Lauder.

Reaping the benefits

Despite the effort and the costs, companies are unanimous in asserting that benefits have stemmed from certification. BP Amoco's Andrew platform, for example, has found an improved relationship with the legislators, the Department of Trade and Industry (DTI). This was clear during both drilling of a new well, and when

applying for a flare consent.

Shell's greatest benefit has been 'environmental awareness among the workforce', says Steve Turner. Moreover, 'regulators have more confidence when they come for inspections'. The company also finds it easier to comply with legislation 'because as part of our management system, everything is upfront and monitored'. Turner states that, at a commercial level, 'we feel that if a customer was choosing an operator, all other things being equal, they would opt for one with certification'.

Through certification, 'environmental priorities have increased in profile' within Barmac, says Angus Mackay, Senior Environmental Advisor. 'Getting the "buy-in" on environment from the staff on the ground is much easier with ISO 14001. Everybody is well aware of the environmental policy, and that is reflected during client audits.' Externally, Barmac found it 'very prestigious to be the first fabricator in the oil and gas sector to achieve certification, and it has gone down very well with clients'.

Kvaerner Oil and Gas 'already have had positive comments from a couple of clients,' says Bob Lauder. 'Those that don't have an environmental management system in some cases requested us to help them improve their own environmental performance using our system.' The certification effort has also had a marked effect on the company's worksites. 'They now look like more efficient, orderly workplaces. Everybody has raised their standards.'

Industry norm?

Will ISO 14001 become a norm for the industry? Certified companies currently do not set the standard as a mandatory requirement for their subcontractors, but this may change as expectations are raised. Shell's 'green procurement programme' is such that 'we cannot order from just any supplier', says Steve Flynn. 'We will go for a company with ISO 14001 rather than one without, all other things being equal.'

Amerada Hess's contractors 'don't need to have ISO 14001 certification, but we expect them to have a structured approach to environmental management', explains Eddie Cameron. Moreover, during tender evaluation, 'we do look at contractors' environmental qualifications, especially if we are working in a sensitive area'.

At Barmac, 'we have developed a subcontractor approval procedure which reflects our commitment to achieving improved environmental performance,' says Angus Mackay.

Kvaerner's feeling is stronger – 'We would hope ISO 14001 will differentiate us from the pack. We would say the same of our potential contractors,' comments Bob Lauder.

Whether ISO 14001 becomes an obligatory qualification in the industry remains to be seen. In the meantime, companies who have achieved the standard will gain not only public relations kudos, but more fundamentally, environmental benefits. As one Environmental Manager put it, 'Don't go for certification to get the bit of paper: do it to achieve environmental improvement'.

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Crude oil marine measurement loss annual review

This article by *Paul S Harrison* – Consultant to the PM-L-4(A) Crude Oil Marine Loss Database Panel – presents findings from analysis of the 1998 data, updating the 1997 analysis which was reported in *Petroleum Review* in November 1998.

The PM-L-4(A) crude oil marine loss database panel collects and analyses worldwide crude oil shipping data with the general aim of improving loss control through a better understanding of loss patterns and trends. The losses noted are almost entirely apparent rather than physical losses and result from the combination of fixed and random errors in the measurement systems used at load and discharge.

The Panel was formed in 1986 and membership has grown steadily. The following 22 companies submitted data for 1998:

● AGIP Petroli ● Amerada Hess ● BP Oil ● Chevron International ● Conoco ● Elf France ● Elf International ● Esso Petroleum Company Ltd ● Exxon Company International ● Marathon ● Mobil ● Petrofina SA ● Petrogal SA ● PMI Pemex ● Repsol Petroleo ● Saras ● Scanraff (PREEM) ● Shell ● Statoil ● Sunoco Inc ● Texaco ● Total

Panel members submit their company data for analysis and an annual report is issued individually to all members. This report includes a confidential analysis of the individual company data together with a general global analysis of the entire annual data set.

Membership is open to all users and producers of crude oil and companies interested in joining the panel should contact the Chairman of PM-L-4(A) via the Institute of Petroleum.

Database growth

The size of the database has increased over the years, due partly to the growth in membership but also as a result of existing members gathering data from additional affiliates. This growth slowed a little in 1998 as shown in **Figure 1** with a total volume of 3.93bn barrels for voyages with full load and discharge data.

Comparative figures for 1998[1] indicate that full measurement data on over 35% of world seaborne crude is included in the 1998 data base with bill of lading (BOL) data on 42% of the world total.

The number of sets of individual voyage data submitted fell in 1998 to 6,700, but the mean volume per voyage increased by just over 2.5%.

Global mean loss

With the database including over a third of the global shipped volume it seems reasonable to assume that the overall mean loss by voyage from the database provides a good estimate of the global situation. The mean net standard volume loss (NSV) figure will be weighted by the number of voyages in the database for each crude/load port which is closely related to volume. The internal weighting will change year-on-year as crudes and volumes change but the database is now sufficiently large not to be unduly influenced by input from new members or by other minor structural changes.

Mean NSV loss from the database from 1989 to 1998 is plotted in **Figure 1**. The overall improvement since 1989 is readily apparent. Mean NSV loss for 1998 was –0.191% (by convention, losses are given as negative). This is 0.005% less than in 1997 and although the recent small changes are not statistically significant individually it seems that a minor upward trend apparent since 1995 is reversing.

Loss comparison

Table 1 gives mean NSV loss and standard deviation for shipments of the most popular crudes in the data base (20 or more voyages with full data). The mean of the reported API gravity is also given, together with the overall percentage loss based on total barrels shipped.

For comparison, figures for NSV loss calculated by voyage are given for 1998 and 1997. Where a grade is not reported for 1998 as the number of

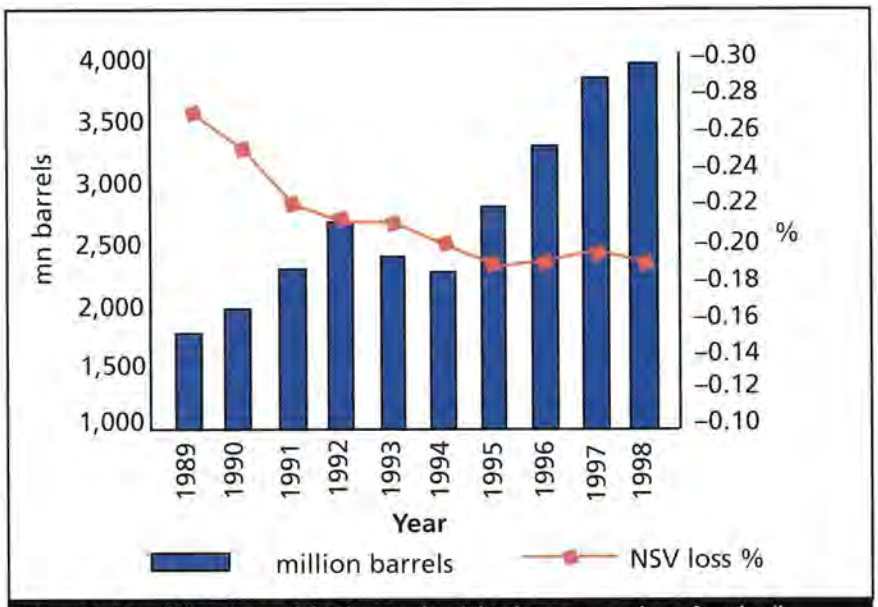


Figure 1: Growth in volume of database and weighted average net loss of crude oil

Crude type	API gravity	Overall volumes (NSV)			Calculation by voyage 1998 NSV loss %			1997 NSV loss %		
		Total barrels	Barrels loss	Barrels loss %	Mean	Std dev	No	Mean	Std dev	No
A960	17.5	–	–	–	–	–	–	–0.32	0.76	22
Alaskan North Slope	30.0	162,656,815	–117,421	–0.07	–0.07	0.16	219	–0.05	0.16	246
Alba	19.2	12,656,609	–13,432	–0.11	–0.10	0.57	24	–0.06	0.17	26
Amna	37.5	31,546,999	–61,739	–0.22	–0.23	0.21	49	–0.24	0.20	46
Anasuria	38.7	–	–	–	–	–	–	–0.16	0.85	23
Arab Ex Lt	38.0	55,748,885	–78,677	–0.16	–0.14	0.46	78	–0.18	0.44	81
Arab Heavy	27.8	91,569,956	–316,445	–0.38	–0.31	0.61	122	–0.36	0.68	85
Arab Light	33.0	233,008,961	–436,225	–0.22	–0.17	0.43	243	–0.17	0.38	306
Arab Medium	30.7	102,474,742	–228,215	–0.25	–0.25	0.56	132	–0.18	0.69	149
Basrah Light	33.1	53,468,566	–122,373	–0.24	–0.25	0.31	42	–0.22	0.46	26
Belayim	28.3	20,792,952	–8,008	–0.04	–0.04	0.26	42	–0.26	0.32	26
Beryl	37.6	–	–	–	–	–	–	–0.14	0.69	27
Bonny Light	35.2	58,277,012	–34,765	–0.09	–0.09	0.39	51	–0.13	0.45	54
Bonny Medium	29.5	12,928,942	–29,782	–0.31	–0.28	0.48	22	–0.06	0.56	27
Bouri	26.2	17,706,165	–57,881	–0.33	–0.34	0.40	31	–0.21	0.31	34
Brass	41.9	–	–	–	–	–	–	–0.27	0.22	21
Brent	38.6	76,779,582	–37,534	–0.05	–0.04	0.17	111	–0.10	0.20	197
Cabinda	32.9	50,882,758	–50,289	–0.11	–0.10	0.24	50	0.13	0.67	40
Cano Limon	29.5	–	–	–	–	–	–	–0.10	0.15	36
Captain	19.2	10,607,908	–21	0.00	0.00	0.26	21	–	–	–
Caripito Blend	22.1	20,211,330	–5,683	–0.03	–0.03	0.36	39	0.07	0.34	47
Cusiana	39.4	27,250,561	–72,786	–0.27	–0.27	0.18	38	–0.27	0.22	23
Danish	36.2	15,307,322	–21,824	–0.15	–0.14	0.13	26	–0.26	0.25	38
Draugen	40.8	47,244,545	–157,810	–0.34	–0.34	0.15	56	–0.29	0.13	65
Dubai	31.2	–	–	–	–	–	–	–0.26	0.20	35
Ekofisk	38.4	112,749,122	–32,332	–0.03	–0.03	0.13	167	–0.07	0.18	161
Es Sider	36.6	20,006,131	–67,381	–0.35	–0.35	0.47	34	–0.44	0.20	36
Escravos	34.5	61,458,673	–64,208	–0.11	–0.12	0.20	53	–0.13	0.25	50
Flotta	36.2	47,472,184	–130,086	–0.28	–0.28	0.20	75	–0.33	0.29	84
Foinaven	25.9	34,861,456	100,810	0.30	0.32	0.51	66	–	–	–
Forcados	30.0	72,282,221	–29,897	–0.06	–0.09	0.35	35	–0.20	0.35	44
Forozan	30.6	59,603,224	–103,244	–0.19	–0.17	0.28	62	–0.17	0.37	54
Forties	40.5	96,976,978	–148,374	–0.15	–0.15	0.13	145	–0.11	0.18	191
Furrial	30.1	28,349,954	–23,767	–0.08	–0.06	0.34	49	–0.18	0.21	50
Gullfaks	33.2	92,254,287	–233,898	–0.26	–0.26	0.17	111	–0.21	0.28	151
Harding	20.4	18,183,182	–87,775	–0.50	–0.54	0.53	34	–	–	–
Heidrun	28.4	25,206,625	11,184	0.05	0.02	0.23	37	0.02	0.21	43
Iranian Heavy	30.5	120,402,954	–254,674	–0.25	–0.18	0.30	107	–0.25	0.38	78
Iranian Light	33.4	67,730,500	–161,454	–0.25	–0.21	0.27	68	–0.14	0.18	35
Isthmus	33.3	76,729,075	–24,124	–0.19	–0.19	0.57	25	–0.07	0.69	32
Khafji	28.4	–	–	–	–	–	–	–0.31	0.43	21
Kirkuk	35.3	143,320,348	–357,882	–0.25	–0.23	0.25	142	–0.27	0.25	62
Kuwait	31.0	–	–	–	–	–	–	–0.20	0.53	38
Leona	23.3	–	–	–	–	–	–	0.17	0.66	22
Lower Zakum	39.9	22,187,056	–72,455	–0.36	–0.34	0.16	50	–0.44	0.13	41
Maya	21.5	386,040,155	–238,999	–0.23	–0.22	0.33	197	–0.27	0.30	229
Mesa	30.1	30,374,576	1,406	0.00	0.02	0.26	35	–0.17	0.31	35
Murban	39.6	36,907,703	–113,487	–0.33	–0.32	0.29	60	–0.33	0.26	67
Norne	32.5	18,109,097	–27,745	–0.18	–0.17	0.26	21	–	–	–
Olmeca	38.4	172,593,993	–158,213	–0.19	–0.19	0.25	148	–0.20	0.32	171
Oman	33.1	17,877,615	–41,794	–0.26	–0.27	0.12	25	–0.23	0.37	27
Oriente	25.3	9,260,969	17,641	0.19	0.20	0.59	26	0.13	0.31	31
Oseberg	36.8	62,057,328	–101,223	–0.17	–0.15	0.16	77	–0.11	0.22	72
Qatar Land	41.3	21,767,694	–71,900	–0.36	–0.37	0.09	39	–0.30	0.19	55
Qatar Marine	33.4	26,054,121	–73,159	–0.30	–0.31	0.14	40	–0.19	0.17	26
Qua Iboe	36.5	51,345,646	–61,804	–0.12	–0.15	0.39	43	–0.02	0.38	40
Rabi Light	34.7	37,644,249	–57,148	–0.27	–0.26	0.22	24	–0.26	0.23	28
Russian Export Blend	32.4	124,262,694	–207,332	–0.17	–0.15	0.27	192	–0.13	0.30	175
Sahara Blend	46.0	45,774,383	–69,376	–0.16	–0.15	0.22	70	–0.10	0.30	69
Santa Barbara	36.1	13,523,136	–23,041	–0.17	–0.15	0.34	27	–0.45	0.26	24
Sarir	37.6	18,514,707	–58,485	–0.32	–0.34	0.24	35	–	–	–
Siberian Light	35.2	13,297,841	–29,482	–0.22	–0.23	0.28	28	–0.15	0.28	23
Sirtica	40.1	17,515,203	–25,995	–0.15	–0.16	0.16	26	–	–	–
Souedie	24.0	16,549,186	–24,501	–0.19	–0.21	0.50	31	–0.09	0.23	21
Statfjord	38.8	171,958,202	–476,635	–0.28	–0.28	0.26	207	–0.32	0.20	243
Syrian Light	36.1	54,901,841	–163,309	–0.31	–0.32	0.31	91	–0.33	0.29	81
Tengiz	46.3	17,276,868	–89,621	–0.53	–0.57	0.38	47	–0.39	0.32	29
Troll	28.3	22,654,976	–1,917	–0.01	–0.01	0.20	45	0.07	0.18	46
Umm Shaif	37.3	16,008,638	–50,648	–0.38	–0.38	0.10	40	–0.39	0.12	33
Upper Zakum	34.2	–	–	–	–	–	–	–0.29	0.26	22
Wytch Farm	41.6	17,374,591	–7,511	–0.04	–0.04	0.15	28	–	–	–

Table 1: Analysis by crude oil type 1998

Crude type	Mean NSV Loss % Original	corrected	Table difference %
Arab Ex Lt	–0.28	–0.07	0.22
Arab Heavy	–0.64	–0.54	0.10
Arab Light	–0.23	–0.12	0.12
Arab Medium	–0.37	–0.27	0.10
Saharan Blend	–0.29	–0.24	0.05
Souedie	–0.15	–0.11	0.03
Syrian Light	–0.44	–0.40	0.04
Zarzaitine	–0.55	–0.52	0.04
		Mean Difference %	**0.092**

Table 2: Effect of table corrections on net standard volume loss figures for individual crude oils

	1998 Mean	1998 Std. Dev.	1997 Mean	1997 Std. Dev.
NSV loss %	–0.19	0.36	–0.20	0.37
TCV loss %	–0.13	0.35	–0.13	0.36
Load difference %	+0.14	0.40	+0.17	0.41
Ship loss %	+0.02	0.20	+0.02	0.20
Discharge difference %	–0.30	0.44	–0.33	0.44
Water loss %	–0.07	0.20	–0.07	0.18
ROB difference %	+0.04	0.16	+0.04	0.16

Table 3: Global loss analysis

data sets has fallen below 20 the API gravity is given as the 1997 mean value.

Note that the data in **Table 1** is not 'table corrected' but based on original bill of lading (BOL) figures. Where possible, for load ports using the'old' Table 6 or Table 54, corrected BOL figures are calculated using 'new' tables for comparison with outturns at discharge ports which also use the 'new' tables. The effect of using table corrected BOL data for specific crudes is shown in **Table 2**.

It should be noted that as the information in **Table 2** is derived from a smaller set of voyages than those used for **Table 1** (ie those with both corrected and uncorrected BOL figures) the actual mean losses will differ.

Detailed loss analysis

In addition to NSV loss figures the database contains details of all measurements made through each voyage. This enables more detailed analysis to determine where losses are occurring and sets realistic performance limits for each stage in the measurement process.

Overall results for each of the main measurement differences are shown in **Table 3**, comparing figures for 1998 with those for 1997. The only significant difference between the two sets of results is a small reduction in the gain seen at load (load difference) which is balanced by a similar reduction in the loss seen at discharge (discharge difference). Key comparisons used in the analysis are as follows:

- NSV (net standard volume) and TCV (total calculated volume) losses are simple comparisons between bill of lading and outturn figures. Net standard volume (NSV) is the volume of crude corrected to 60°F with sediment and water quantities (free and dissolved) deducted. Total calculated volume (TCV) is the NSV plus sediment and free and dissolved water.
- Load difference is the TCV difference between ship received and shore delivered volume at loading. Discharge difference is the TCV difference between the ship discharged and shore received volume at discharge. Load and Discharge Differences are not corrected for VEF (vessel experience factor). However these corrections are now made in detailed reports to members.
- Ship loss or 'transit difference' is the difference between ship TCV

Crude Oil Loss Committee PM-L-4 – an invitation

For the first time in its history the Institute of Petroleum (IP) is to hold a meeting in the Western Hemisphere. The meeting is to be hosted by PMI-Pemex in Oaxaca, Mexico on 9, 10 and 11 November 1999. Potential new members are invited to attend as observers and the programme should be of considerable interest to anyone concerned with marine transport of crude oil and in-transit 'losses' resulting from measurement variations.

The committee comprises two panels:

- *PM-L4A: The Crude Oil Database Panel* – Membership of this panel is restricted to producers and users of crude oil who are able to provide detailed voyage data each year for statistical analysis with the general aim of improving loss control through a better understanding of loss patterns and trends. Global and individual reports are prepared for members submitting data and main findings are published each year in *Petroleum Review*. Specific topics studied this year include vessel characteristics related to measurement.
- *PM-L-4B: The Crude Oil Measurement Panel* – This panel includes members of PM-L-4A together with representatives of tanker operators (Intertanko), independent inspection companies (IFIA) and terminal operators. Consultants and guest speakers are regularly invited to attend. An open forum is provided for members to identify common measurement problems. These are then passed to the Petroleum Measurement Committee for consideration as new IP work items.

The panel has recently produced a Petroleum Measurement Paper *No. 8 – Guidelines for the Crude Oil Washing of Ship's Tanks and the Heating of Crude Oil Being Transported by Sea.* This document provides general guidance together with detailed data for over 400 crude oil grades.

PM-L-4B will meet on the 9 and 10 November and PM-L-4A will meet on the 11 November. Companies attending on the 11 November should be producers or users of crude and in a position to submit data to the panel if they apply to join.

For further details please contact John Phipps at the IP on Tel: +44 (0)171 467 7130, e: jp@petroleum.co.uk

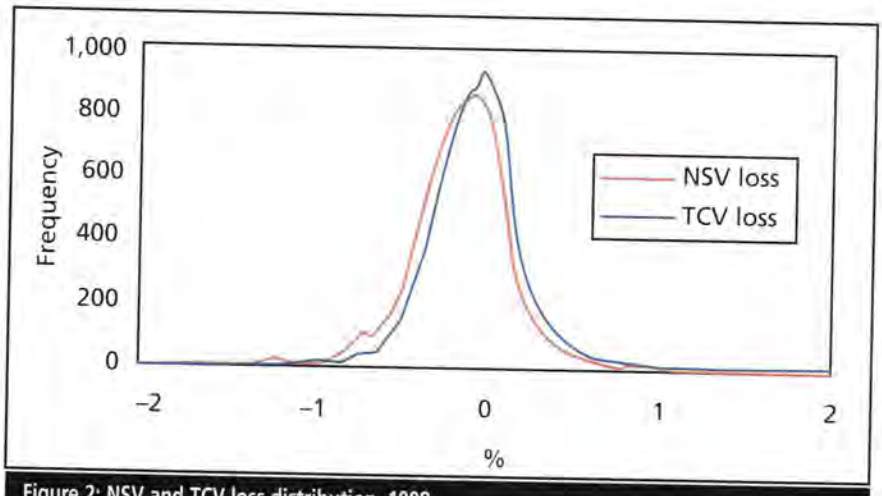


Figure 2: NSV and TCV loss distribution, 1998

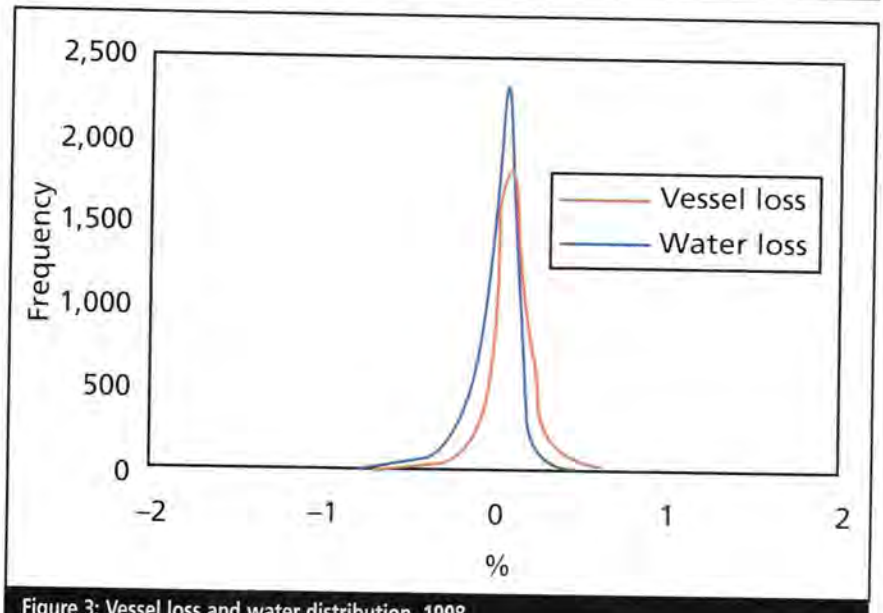


Figure 3: Vessel loss and water distribution, 1998

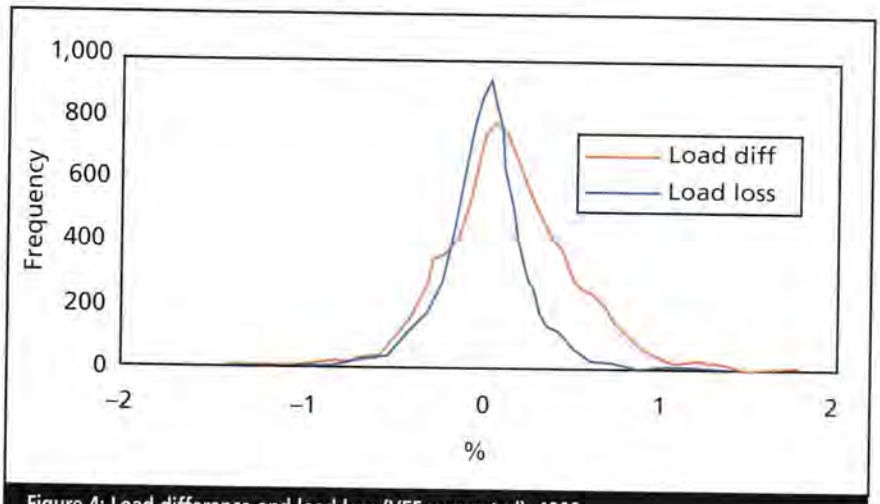


Figure 4: Load difference and load loss (VEF ccorrected), 1998

measurements at the load port before sailing and at the discharge port on arrival. Water loss is the difference between bill of lading and outturn water and sediment, adjusted for ROB/OBQ water difference where figures are available.

- ROB difference is the difference between the TCV measured on the ship prior to loading (OBQ) and that remaining after discharge (ROB).

These measurement differences all have distributions which are very close to the normal distribution, thus allowing comparisons to be made and probabilities to be calculated using standard statistical methods.

Figures 2, 3 and **4** show some of the global distributions for 1998. It can be seen that the vessel loss and water loss distributions are narrower than the NSV and TCV Loss distributions.

The Load Difference distribution plotted in **Figure 4** is even more spread than the NSV loss and for this reason the more closely distributed VEF corrected Load Loss figures are used for detailed comparisons and trending of load port and crude grade performance. Similarly, VEF corrected discharge loss figures are used for discharge port comparisons and trending.

Conclusions

The 1998 data indicates that the loss reductions seen from 1989 through to 1995 have now levelled off. Mean NSV loss for 1998 was –0.191% compared with –0.196% in 1997.

The database expanded a little in volume from 1997 but total number of voyages fell slightly. However, it is estimated that over 35% of world seaborne crude is included for 1998.

The panel has a target of 50% of seaborne crude trade and it is hoped that holding the first meeting outside Europe (in Oaxaca, Mexico, in November) will attract new members from both North and South America. A Membership Guide is available and prospective new members are encouraged to contact the Chairman for a copy. All additional data adds to the value of the database and the information which is derived from it.

With the recent recovery in oil prices these 'measurement losses' represent around $500mn worldwide and oil companies working through their loss control groups are urged to continue their support of activities aimed at understanding and reducing these losses.

1. *BP Amoco Statistical Review of World Energy 1998*

Any questions or comments on the content of the paper or any other aspects of the activities of the panel should be addressed to the Chairman of PM-L-4(A) panel at the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK.

Chevron link with Sasol boosts gas-to-liquids

With oil prices once again strengthening, the industry's continuing interest in monetising abundant global gas reserves into ultra-clean burning fuel is sparking intriguing joint ventures. Sasol of South Africa's gas-to-liquids (GTL) synfuel technology is back on the agenda, with the US major Chevron joining forces. Who is in the driving seat in this joint venture will only become apparent when the deal is further down the road but some aspects of the new venture are already apparent, writes *Priscilla Ross.*

Sasol and Chevron both have technology inputs to bring to the gas-to-liquids (GTL) party. Chevron's financial muscle is awesome with earnings of $1.339bn in 1998. Although this was 59% below the company's record $3.256bn earnings in 1997, even the depressed 1998 profit was more than the combined GNP of the western African countries that will initially be targeted for stranded gas. In contrast, Sasol had earnings of US$564mn in 1997.

The motivations behind the joint venture are clear. In the post Kyoto Protocol era there is a growing demand for clean fuels, particularly clean diesel, as part of the drive to reduce carbon dioxide (CO_2) emissions. The clean diesel produced by the GTL conversion process typically has less than 5ppm of sulfur against the typical 200ppm in conventional diesel.

A worldwide trend to reduce diesel's sulfur content to a maximum of 0.05% (500ppm) is already underway, with northern Europe, California and Japan leading the way. For 2005 the European Union is proposing a reduction to 0.005% (50ppm). Sasol's slurry phase distillate process (SPD) produces effectively sulfur-free diesel fuel, as all the sulfur is removed from the natural gas before being converted into synthesis gas.

The SPD diesel also has virtually no aromatics content. Conventional diesel fuels can contain as much as 25% aromatics by volume. It has been established that higher aromatics levels increase particulate emissions from diesel engines. To reduce emissions, authorities worldwide are now proposing revised specifications reducing allowable aromatics content.

Cetane number

Cetane number is used to characterise a diesel fuel's combustion properties. Lower cetane number fuels tend to produce incomplete combustion, especially at the lower temperatures when an engine is started. Effectively, the higher the cetane number, the greater the combustion efficiency and the lower the gaseous emissions.

Current specifications usually require diesel fuel to have a minimum cetane number of 45. SPD fuel massively exceeds that with a cetane rating of over 70. The use of high cetane fuels can produce emission improvements of up to 59% less hydrocarbons, 28% less nitrous oxides (NO_x), a 33% reduction in carbon monoxide (CO) and up to 21% less particulates from diesel engines. Alternatively, high quality SPD derived diesel can be used as a blendstock to enhance crude derived diesel.

Gas reserves

Over the last decade the world's proven natural gas reserves have grown by 25%, reaching an estimated 5,200tn cf at end December 1998. The Middle East has one-third of these reserves and the Former Soviet Union (FSU) around 39%, according to BP Amoco's latest *Statistical Review*.

Global gas consumption had outpaced oil consumption in all geographic areas in recent years but, with a reserves-to-production ratio of 63 years, gas reserves are widely seen as under utilised. In addition, there are numerous gas accumulations which are 'stranded', in the sense that there is no economic outlet for them. It is these reserves that are the natural target for GTL schemes.

Chevron has a vast global asset base from which gas can be tapped, but its marketing capability is particularly potent, with its geographical head office presence in California, where the Air Resource Board regulations on clean diesel create a market on its own doorstep.

US demand

On the West Coast of the US clean diesel is likely to command a premium because of its ability to help refiners and marketers meet ever-tighter diesel specifications. Chevron clearly realised there had been a paradigm shift towards the use of clean diesel and aims to exploit the potential of high quality gas-derived product.

The joint venture deal being structured between Chevron and Sasol is not exclusive but is an open-ended mechanism. It will not only embrace gas owned by the two principals in this deal but will be extended to gas owned by other parties.

According to the Memorandum of Understanding signed on 9 June 1999, there will be a 50:50 global joint venture between Chevron and Sasol. However, there are many ancillary issues that need to be ironed out over the next six months. What is still on the table is the domicile of the joint venture company and the currency the balance sheet will be denominated in.

First, a global joint venture will be established and after that subsidiary ventures will be spun off, possibly with other parties and for particular geographical locations. These project specific subsidiary ventures will be financed on or off balance sheet depending on the particular case.

The global joint venture will set out quite clearly that the intellectual copyright of the technology will remain the sole property of the parents. Chevron has a patent on cracking wax and Sasol has its own self-engineered Sasol slurry phase distillate process, which is also patented.

Nigerian venture

According to Cavan Hill, Sasol's Business Development Manager, the first subsidiary joint venture is likely to be in Nigeria. He notes 'There are several other opportunities for low cost stranded gas but I can't be specific'.

Nigeria produces vast amounts of gas in association with its 2.15mn b/d oil output. Around 70% of this gas is currently flared although the start-up of the Bonny LNG facility this autumn will reduce the flaring.

Hill also noted that stranded gas typically occurs in West Africa, the Middle East, Latin America, the Caspian Sea and other areas of the Former Soviet Union and that all these areas have GTL potential.

Over the last two years Sasol has been optimising catalyst development and fine tuning the operating economics of its proprietary technology. Sasol's new generation cobalt catalysts in particular will enable further operational improvements.

Two years ago the capital cost of a 10,000 b/d plant was between US$300mn and 350mn. Sasol's new generation Fischer-Tropsch technology is now said to have cut costs to between $200mn–$250mn. This equates to a daily cost per barrel of capacity of US$25,000–$30,000, including utilities, off-site facilities and infrastructure units.

Alaskan stranded gas

What constitutes a source of low cost stranded gas can be a complex calculation that takes into account the costs (and acceptability) of flaring and/or re-injecting and likely future environmental legislation and penalties.

All these aspects come into play when considering stranded gas on the North Slope of Alaska at Prudhoe Bay. The extreme climatic conditions increases the capital cost of a GTL plant but Alaska is still a possible location for a GTL facility because of large volume of stranded gas, some of which has been re-injected into the wells.

The first option is a GTL plant in the north, with the product spiked into the crude flow through the existing pipeline. The second is for a new gas pipeline accessing Alaskan gas and transporting it to southern Alaska where the climate is warmer. The gas could then be converted to either liquefied natural gas (LNG) or to liquids.

It is usually assumed that to produce 10,000 b/d of liquids, 100mn cf/d of stranded gas needs to be available. In evaluating GTL projects gas feedstock is usually valued at US$0.50 per 1,000 cf. However, in developed centres with established infrastructure, such as Europe and the US, the economics do not apply and the cost of the gas could be several dollars.

The benchmark gas cost of US$0.50 per 1,000 cf (or $5/b) does not take into account any cost or financial penalties of flaring. Fixed and variable GTL plant costs (including labour, maintenance and catalyst) are typically around $5/b.

This GTL cost structure is not set in stone and Hill says 'it may go up a bit. The cost of transport once again depends on the location of the stranded gas but as a rule of thumb $1/barrel is the working estimate'.

This gives a direct cost of production of around $10/b, excluding the cost of financing the plant and $1 for transport.

Conclusion

The claimed advantage of GTL technology is that the start-up capital cost is relatively modest at $200mn to $250mn for a 10,000 b/d module and that capacity can be built up in steps.

GTL advocates claim that, in future, clean diesel may attract premium pricing of between 10 and 30% over conventional fuel as more stringent regulatory regimes are applied around the world. The key question is how large will be the premiums for GTL fuels' superior qualities and how quickly will they emerge?

	LNG Japan cif	Gas European Union cif	Gas Heren Index UK	Gas Henry Hub US	Gas Canada Alberta	Oil OECD cif
1985	5.23	3.83	–	–	–	4.75
1986	4.10	3.65	–	–	–	2.57
1987	3.35	2.59	–	–	–	3.09
1988	3.34	2.36	–	–	–	2.56
1989	3.28	2.09	–	1.7	–	3.01
1990	3.64	2.82	–	1.64	1.05	3.82
1991	3.99	3.18	–	1.47	0.89	3.33
1992	3.62	2.76	–	1.77	0.97	3.19
1993	3.52	2.53	–	2.10	1.69	2.82
1994	3.18	2.24	–	1.92	1.50	2.70
1995	3.46	2.37	–	1.69	0.89	2.96
1996	3.66	2.43	1.84	2.76	1.12	3.54
1997	3.91	2.65	2.03	2.53	1.36	3.29
1998	3.05	2.27	1.92	2.08	1.42	2.18

Source: BP Amoco Statistical Review of World Energy, June 1999

Natural gas prices/US dollars per million BTU

Feedback key to the success of Lifetime Learning

What is the difference between people who continue to learn throughout their lives and those who do not? It is probably related to what Milton Rokeach called 'open and closed minds'. But there is more to it than having an open *mind*. Carl Jung once said that in order to be influential you have to be open to *influence*. In other words, it is not just about *intellectual* openness – it is also about how willing you are to be influenced in your relationships. *Stephen Flett* and *Andrew Thomas explain why such openness is the key to the Lifetime Learning philosophy.**

Let us remember how feedback used to be. It was mainly downwards in direction. Bosses would rate 'subordinates' using adjective checklists. It represented one person's view and was usually a one-way communication. It was a crude and infrequent process. It was almost universally criticised by recipients as unhelpful and often unfair.

The purpose of feedback is for the recipient to learn and develop. To be effective, feedback has to engage the recipient and to be perceived as relevant and fair. In the 1960s, perhaps in line with or in reaction to social trends, *upward feedback* began to appear, in which direct reports gave feedback on the boss's performance. This trend started in the US and migrated to the UK through American companies such as IBM and Rank Xerox. *Multi-rater feedback* or *360° feedback* is an extension of upward feedback in which the target person receives feedback from their boss, direct reports and peers/colleagues – ie downwards, upwards and sideways. Nearly all feedback processes now include self-ratings. Most feedback is given confidentially unless the providers choose to reveal their identity. Many feedback processes are designed and facilitated by external consultants or by specially trained internal consultants.

It is now common for the items on the feedback forms to reflect the competencies, values and business context of the group and organisation receiving the feedback. The output of the feedback process varies. Different sources are often separated. Bar charts will compare ratings from different groups with self and boss ratings. With off-the-shelf instruments, norms are often provided for comparison with industry samples or with managers worldwide. With bespoke instruments norms have to be collected for the specific organisation. Some instruments come with development guides and workbooks (as with the Lifetime Learning package offered by the Institute of Petroleum). Others are followed through by debriefing or coaching processes.

Most surveys show that organisations and recipients appreciate these new structured feedback processes. A well-structured 360° feedback process is usually perceived as richer and fairer than the old-style downward appraisals.

But does all this feedback improve performance and contribute to 'lifelong learning'? Our answer is that: 'It all depends...'

Research on feedback

US studies reveal that managers whose self-ratings systematically exceed others' ratings of them ('over-raters') do worse in the long-term compared to accurate self-raters and under-raters on various measures such as pay, promotion and performance ratings. Sometimes the ones who need the feedback most are the most defensive about the process. It can pay (literally) to be aware of your impact on others.

Two-year follow-up studies show that structured feedback with appropriate development planning can and does lead to improvement in management skills, closer agreement between self and others' ratings and enhanced career progression.

Clearly, the processes described above – which more and more organisations are using – provide ample *opportunity* for learning how others perceive you, how effective your working relationships are and what your strengths and development needs are. Whether these learning opportunities are fully exploited depends a great deal on how the feedback process is managed, the culture of the organisation and the value the individual places on feedback.

- With junior managers it may be important to establish the value of feedback in their career development.
- With cynical managers further down the career path, it is important to find a hook that links the feedback process to something important to them.
- Senior managers can usually be motivated by seeing the business potential in unblocking channels of communication and gaining commitment from those below.

Feedback can be a part of culture change but it will need to be supported by performance review, coaching and other human resources practices. Several key factors need to be present for feedback to contribute to learning:

- Preparation of participants to deal with their concerns and to help them get the most out of the process.
- Confidentiality and security of the data.
- Guarantees that the process will focus on development and not selection decisions.
- A supportive learning climate in the organisation to make use of the feedback.

Intention and impact

One of the most recurring and powerful themes of feedback is the difference between *intention* and *impact*. You

know what you are trying to say and do in your leadership role but you cannot *know* your impact on others unless you listen to their feedback. In order for that feedback to be honest the climate has to be constructive. In order for it to be relevant and fair the process has to be carefully designed and managed.

To illustrate how feedback can bridge the gap between intention and impact, there was an IT director in the transport industry who received 360° feedback as part of a leadership development programme. He was a bright, introverted and considerate man. He received positive feedback on his strategic communication, his business focus, willingness to consult others and many other areas. However, he also received a few comments that he was self-absorbed and difficult to get to know. It later emerged that after his journey to work he had sorted his priorities for the day in his mind and would march purposefully to his desk to get them down on paper. In the process, he would walk past several of his team and support staff without acknowledging their greetings or glances. In the absence of clear information people would speculate and invent reasons for his failure to recognise them. When he realised this was happening he was disappointed and annoyed with himself and changed his morning routine immediately to include a few minutes of acknowledging others and finding out what was going on in the office. Sometimes, as a result of this, he would change his priorities for the day.

Final word

If organisations and individuals are to be encouraged to continue learning throughout their careers, the feedback processes will have to be simple and friendly to use. More and more organisations are using electronic feedback systems to speed the process and reduce administration costs.

The Feedback International Group is at the forefront of design and technology in this area, with NetReflector, its Internet based feedback and survey tool. This method of running feedback processes is not only appealing to busy managers but also cost-effective, especially for global companies. In the end, however, we often design and run a mix of technologies and processes to suit the clients' needs.

*Stephen Flett and Andrew Thomas can be contacted at the Feedback International Group, The Business Park, Technology Drive, Nottingham NG9 2ND, UK. Tel: +44 (0)115 957 5910.

IP Awards certificates of appreciation

At the recent Annual Council Luncheon and Meeting, Jeff Pym, in his new role as IP Director General, was on hand to present Certificates of Appreciation to the following Committee Members.

Bob Mapledoram (Test Methods)

Bob joined BP as a Technical Assistant in July 1963. In 1971 he was promoted to Chemist in first the Analytical Section, then the Technical Services Division. In 1992 he became Team Leader Technical Services Division, then Team Leader Analytical/Applied Science Division. In 1994 he became Team Leader of the Oil Technology Centre. From 1997 to the present he has held the position of Branch Skills Leader in the Fuels Analysis Group of the Analytical Technology Unit.

Bob first became involved with IP panels in 1984 when he joined the STG-5 Sulfur Panel. Thereafter, from 1985 to 1993, he served on the STB-4 Flammability, STB-5 Stability of Fuels, STB-7 Cold Flow Properties, STB-8 Stability of Light Distillates and STB-9 Volatility Panels. In 1993 he was appointed Secretary of STB-4 – a position he held until 1999. In addition to his IP work he has also represented the UK at CEN and ISO meetings.

Peter Bowles (Test Methods)

Peter, who is at present the Senior Analyst Industrial Products for Castrol, was a member of the IP's STC-3 Viscosity Panel from 1990 to 1992. In 1992 he joined the STC-4 Lubricants General Test Panel and was appointed Chairman in 1994. He also joined the STC Lubricants and Grease Sub-committee. STC-4 has one of the largest portfolios of IP Test Methods to look after and under Peter's chairmanship STC-4 has managed to ensure that they are kept up to date. In addition, where appropriate, STC-4 has provided technical input into the development of international standards based on IP and ASTM test methods.

Eddy Murray (Test Methods)

Eddy joined Esso Petroleum's Research Centre in 1970 working on automotive and jet fuels, lubricants and greases. He then became the cold flow properties Team Leader and was Esso Research's Principal Expert on cold flow and viscometry. At present he is the Quality Assurance Co-ordinator Analytical and is Esso's Principal Signatory for aviation fuel quality release.

His involvement with the IP started in 1990 when he became the Chairman of the Cold Flow Properties Panel STB-7 and a member of the Fuel Sub-committee STB. Under his chairmanship this panel has worked hard to harmonise cold flow tests throughout the world. It has been successful in obtaining agreement for the worldwide acceptance of standard cloud point and cold filter plugging point tests for automotive fuels and a standard freezing point test for aviation jet fuel.

Alan Chamberlain (Petroleum Measurement)

Alan was a founder member of the Petroleum Measurement Loss Control Panel PML-3 and was appointed Chairman in 1990. He is also a member of the main Measurement Committee and has chaired many working groups set up to develop IP guidelines and codes of practice. He represents the IP on various BSI Measurement Committees and he chairs the Marine Cargo Committee PTI/12/3. He has represented the UK at ISO meetings and has been the IP's principal representative at various API Measurement meetings. API has recognised his services to Petroleum Measurement by presenting him with one of its awards.

Alan, who is now working with ITS Caleb Brett, previously worked for Shell Research and Shell International.

Steve Sullivan (Test Methods)

Steve, who is the Analytical Services Manager for Saybolt UK Ltd, has been involved with the IP since 1991 when he joined the STB-10 General Test for Fuels Panel. He became its Chairman in 1993. In 1992 he joined the STG-5 Sulfur Panel and was appointed Chairman in 1995. In 1994 he joined the STB Sub-committee and became its Secretary, a position he still holds.

New analysis for polymer production

Researchers at Ethyl Corporation now use a new analysis method to ensure polymer production quality. This new method, called SEC^3 (size exclusion chromatography cubed), more accurately determines molecular weight and can also measure intrinsic viscosity, reports *Susan V Greene.*

Prior to the adoption of the SEC^3 analysis method, Ethyl chemists employed conventional calibration for molecular weight determination. However, due to difficulty in finding appropriate standards, many polymers could not be accurately measured. The SEC^3 technique was used to analyse a batch of material that formed micro-crystals during the manufacturing process. This new technique confirmed the presence of the micro-crystals and helped elucidate their structure.

Molecular weight distribution is a critical quality control factor in the production of petroleum additives. Directly linked to molecular weight distribution, intrinsic viscosity is another polymer characteristic important in both processing and product performance. Ethyl chemists formerly used conventional calibration to estimate the molecular weight of a polymer from its molecular weight distribution. Conventional calibration provides a relative measure of molecular weight by comparing the hydrodynamic volume of a sample against a standard curve. To provide accurate measurement the structure of the standard set needs to be similar to that of the sample.

New and improved

Ethyl chemists desired a polymer analysis method that would be faster, more accurate, and one that would provide a more thorough understanding of polymer architecture. Ethyl chose the SEC^3 method. SEC^3 uses three detectors to provide a 3D picture of the molecular structure. The first dimension is provided by a chromatographic process, which separates polymer molecules according to molecular size. The second is defined by the light scattering detector response, which yields the sample's molecular weight. The third dimension is measured by the viscometer detector, which gives a response inversely proportional to the sample's molecular density. To set up the SEC^3 , Ethyl chemists combined a Viscotek Model T60A instrument, which consists of a viscometer and a light scattering detector – purchased from Viscotek Corporation, Houston, Texas – with an existing differential refractive index detector, size exclusion chromatograph pump, and autosampler system. The Viscotek viscometer-light scattering system has four-channel data acquisition capabilities and includes TriSEC software, a sophisticated, Windows-based, data processing and graphics package designed to analyse SEC^3 data.

The SEC^3 method has greatly improved the accuracy of molecular weight analysis at Ethyl. Rather than simply conducting a relative measurement with the differential refractive index detector, the new system now also employs a light scattering detector to measure the molecular weight. This approach provides more accurate molecular weight independent of the molecular structure. The use of a light scattering detector also eliminates the need to run a calibration curve. Only a single standard of known molecular weight is required to calibrate the chromatographic system.

Calculating branching

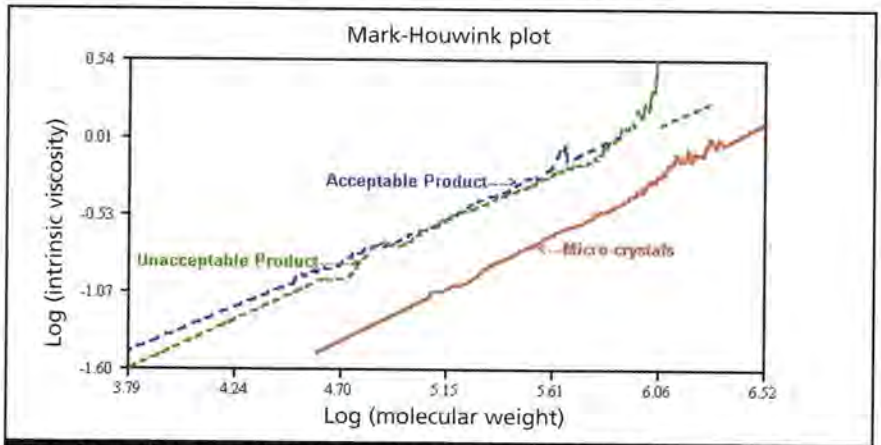
Quantitative calculation using all three chromatograms yields the molecular weight distribution, the molecular size distribution, and the intrinsic viscosity (IV) distribution. The relationship between two of these parameters is shown in a Mark-Houwink plot, which is a log-log plot of IV against molecular weight for a given sample. Such a plot can clearly indicate differences in branching even for samples with the same molecular weight. Because the structure is more compact, branched molecules have much lower IV values than linear molecules of the same molecular weight. If an appropriate reference branch sample is available, it would also be possible to calculate the number of branches and branching frequency for a given branched polymer sample.

First application

One of the first opportunities for Ethyl chemists to use this new technology came when micro-crystals appeared during a production process. The SEC^3 clearly established that the molecular weight distribution curve had shifted toward higher molecular weight in the sample containing micro-crystals. The branching information extracted from the Mark-Houwink plot provided further insight into the architecture of the micro-crystals. Knowledge of molecular weight distribution and the architecture provided the needed clue that led to examination of production records in the plant. The investigation highlighted one particular process parameter that was critical for the production of micro-crystals. Product quality is now ensured by more closely monitoring this parameter.

For further information contact Viscotek Corp, 15600 West Hardy Road, Houston, TX 77060, USA, Tel: +1 281 445 5966, Fax: +1 281 931 4336, website: **www.viscotek-usa.com**

**Susan V Greene is Senior Research Chemist, Ethyl Petroleum Additives, Richmond, Virginia*



The relationship between intrinsic viscosity and molecular weight is shown in a Mark-Houwink plot

Immediate respiratory protection for maritime emergencies

Designed to enable immediate escape in any maritime emergency where there may be a danger from fire, smoke, toxic gases or lack of oxygen, the Draeger RapidAir Emergency Escape Breathing Apparatus is said to be both lightweight and simple to use.

'The system provides full, high performance respiratory protection for up to 5, 10 or 15 minutes and is easy to put on, even in the dark', says the company. 'In the event of an emergency, all the user has to do is open the carry bag, place the hood over his or her head, and escape.'

Approved to prEN1146, the system features a pneumatic design to ensure a fast, secure pull-pin activation which immediately provides a constant flow of compressed air before the hood is placed over the head. The positive pressure hood also features an anti-mist visor, a soft inner mask to minimise carbon dioxide build up, and a latex neck seal for maximum safety and comfort. The RapidAir is also said to be suitable for use by people with beards, glasses and those with long hair, and does not restrict vision or impair hearing.

The system is supplied with a high visibility orange carrying bag which can be worn as a chestbag or bandolier. It is both chemical splashproof and flame retardant, and requires minimal maintenance, states the manufacturer. A range of storage cabinets is also available for internal or external mounting.

Tel: +44 (0)1670 352891
Fax: +44 (0)1670 356266

Titrator portfolio extended with two new models

GR Scientific has widened its range of GRS2000 coulometric Karl Fischer titrators with the launch of two new models: the VA2000 moisture vaporiser and GM2000 gas flow meter. The combined operation of the VA2000 and titrator enables water content determinations of solid samples while the GM2000 enables accurate measurement of gas samples. The GRS2000 titrator is supplied with a carry case and is suitable for both lab and in-field use.

Tel: +44 (0)1525 404747
Fax: +44 (0)1525 404848

GRS2000 titrator (centre), GM2000 gas flow meter (left) and VA2000 moisture vaporiser (top)

Tube fittings ID scheme eliminates errors

Parker Hannifin's Industrial Products Division has introduced a new identification scheme for its tapered thread A-LOK and CPI instrumentation tube fittings in a bid to reduce installation and maintenance time, and to improve system integrity and safety.

All straight connectors with tapered threads manufactured in Europe are clearly roll-marked with the thread type in the undercut of the tube end so its identity is clearly visible while it is being connected. 'This makes it quick and easy for installation and maintenance staff to select the right fitting, and eliminates the possibility of accidental misassembly,' comments the company.

Distinguishing between NPT and BSPT tapered thread fittings by eye alone is difficult due to the fact that the taper is identical and the number of threads per inch is very similar. These similarities also make it possible to make a poor quality connection between an NPT tapered thread fitting and a female BSPT part, or vice versa. Parker Hannifin already supplies such fittings with coloured caps to clearly identify the type of thread – red for BSPT fittings and blue for NPT.

The permanent roll-marking identification scheme is to be extended to the company's shaped parts portfolio.

Tel: +44 (0)1271 313131
Fax: +44 (0)1271 373636

Improved well data use

GeoPressure Technology has launched an updated software product – PressureView 2.1 – which is designed to allow oil exploration and development operators make better use of the routine borehole measurements of formation pressures taken during drilling operations.

The pressure management and interpretation software is capable of handling large volumes of pressure and associated geological, reservoir and drilling data. It can search for pressure data by geographical areas or by a range of engineering and geological parameters, such as mud weight, rock type and pressure type. Multi-well plotting functions are designed to help identify pressure compartments, location of seals and flow barriers as well as fracture gradients, while the location of oil, gas and water-bearing zones and hydrocarbon contacts can be found via a single-well plotting option.

Data can be input and/or edited using a data 'wizard' which guides the user through the data entry process and auto-corrects many common data entry errors. Commercially available pressure datasets can be converted by the company and uploaded into clients' copies of PressureView.

Data can be exported in a variety of user definable ASCII formats and plots can be saved in several image file formats which can then be imported into reports or graphics packages for further graphical enhancement. Plots and data can also be e-mailed from the well site back to base for review by onshore personnel.

Tel/Fax: +44 (0)191 374 2522

New tank gauging system with remote capabilities

The new SiteSentry 800 tank gauging system from TM Technology is said to offer cost-effective, built-in flexibility to cater for all gauging requirements. Highly configurable input programming is possible through an integral four-line, 20-character, backlit display and membrane keypad which, together with onscreen help and eight inputs monitoring any 4-20m signal, gives users maximum set-up choice, states the company.

Four relay outputs are provided as standard, together with an alarm sounder output allowing users to define their own alarm thresholds, including unauthorised product movement to help prevent theft or leakage.

Three communication ports allow temporary or hard-wired connection to a range of other hardware and software include programmable logic controllers, SCADA and distributed control systems. A built-in modem option facilitates linkage to a PC running TM's SiteGlass software in order to monitor tanks at remote sites and utilise the company's remote stock management system. The modem also permits fault detection with automatic contact to TM's service department. Data logging and battery back-up are further options.

Tel: +44 (0)1423 886644
Fax: +44 (0)1423 885948

Flexible airline supply system

Sabre claims that 'operational flexibility and reliability' are the main features of its new Modul Air 2 airline supply system which is now being marketed through its international distributor network.

The Modul Air 2 package comprises of a hose reel, cylinder carrying frame and a high performance pneumatic system, plus a selection of optional accessories which can be used in complete or sub-assembly configurations to meet a wide range of operations where there is a risk of toxic gases or oxygen deficient atmospheres.

Of robust welded construction with corrosion resistant stainless steel and nickel-plated brass components, the system is said to offer low through-life costs due to the small number of parts used in minor and major servicing. The unit's modular design and construction is also claimed to afford ease of servicing. The hose connections feature Sabre's U-clip/O-ring design which is said to be reliable and simple to maintain, while different high and medium pressure hose connections ensure foolproof assembly.

This latest version of Modul Air includes a new pressure reducer and a more compact frame than earlier models, as well as an airline hose-to-hose reel attachment which allows CEN standard hoses to be used. Available in EN139 approved two- or four-man supply configurations, the system can be used as a primary air source or as an emergency back-up air supply for rescue operations.

The air supply system has been designed so that air can be provided from a single cylinder and then switched to a second cylinder when the first is removed and replaced by a new cylinder, thereby providing continuous supply for extended durations, explains the company. In addition, the unit can be used in conjuction with a factory airline or compressor as a supplementary supply source.

Tel: +44 (0)1252 342352
Fax: +44 (0)1252 321921

Double isolation ball valve

Ball Valve UK has developed a new range of double isolation Tandem Ball Valve for use in the offshore oil and gas industry. The new valve offers space, weight and cost savings as the design occupies the same flange-to-flange dimensions as a conventional single ball valve in a wide range of sizes, materials and pressure classes, states the manufacturer.

The range is said to provide a fully fire safe, anti-static and approved alternative to the conventional installation of two single ball valves or other types of valves which are used to meet the UK's legislative requirement of double valve isolation in high pressure pipelines.

'The new tandem ball valve meets the needs of the legislation but eliminates the need for a second valve and the cost of its installation', explains the company. 'The design enables two full bore or reduced bore ball valves to be sited adjacent to each other in a package that occupies only the same space as a single conventional ball valve of the same size. It can therefore replace an existing valve having the same face-to-face dimension without the need for expensive hot working to change pipe work configuration or the installation of a second valve.'

The valve seats are designed to handle a wide range of applications and media requirements. Metal as well as soft seats are offered, with the option to mix both types between the two valves. The seats themselves are mechanically engineered to ensure positive contact for leak-free sealing. Design features include double block and bleed, bi-directional flow, 90° turn open to close, ISO top, variable stem orientation and low torque valve operation.

The current tandem ball valve range offers ANSI class valves from 2- to 12-inches with pressure ratings from 600 lbs to 2,500 lbs. However, the manufacturer states that other sizes and customer requirements will be accommodated where possible.

Tel: +44 (0)116 272 7300
Fax: +44 (0)116 272 7345

NEWS Technology

Optima-ised subsea connection from Vector

A new subsea connector – the Optima – has been released by Vector International. Engineered for the most demanding deepsea applications, the new connector not only provides first time connection every time, according to the company, but also offers greater operational efficiency due to its enhanced angular and axial tolerance and 'revolutionary' seal-ring technology.

The Optima connector can engage around a hub with an angular misalignment of 5° or an axial misalignment of 2 inches (whichever is the lesser). This enhanced misalignment capability is claimed to increase the acceptable closure envelope, thereby increasing the target area. Unlike with other subsea connectors, relaxation on final pull-in alignment helps ensure first-time closure every time, potentially reducing installation time, says the company.

The unit's Duoseal double-action metal to metal sealing technology has a self-energised inner seal to stop the egress of the pipeline contents, plus a second self-energised seal to prevent ingress of water from around the connector. The external seal allows the connector to work in deep waters of over 3,000 metres.

Seal integrity can be confirmed by an easily ROV-accessed annulus test port, which also provides a detection method for leakage throughout the connector's lifetime. According to Vector, the Duoseal eliminates the potentially problematic secondary sealing systems (ie 'O'-rings) required for annulus testing.

Featuring a male to female mating system, the Optima's hub profile is said to improve protection of the seal-ring from potential damage and aids the misalignment capability. It also keeps the mass and space envelope to a minimum in order to keep the unit compact. In addition, the Duoseal profile ensures late contact of seal faces which is claimed to minimise damage risk.

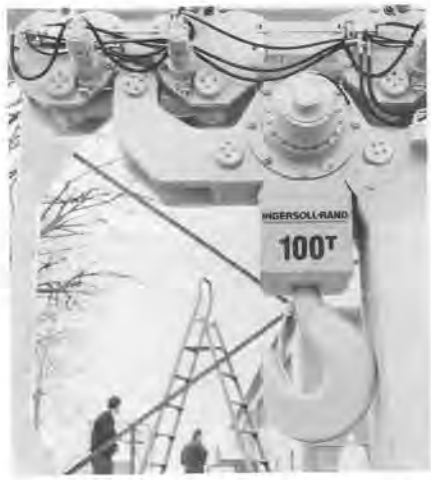
The unit is fully compatible with ROV sled pull-in systems. Remote installation and disconnection is made simple by the use of a single lead screw, needing just 6,000 Nm of torque for connection.

Manufactured from high grade forged nickel allowing for maximum strength and corrosion resistance, the Optima is claimed to have a typical design life of 25 years. It can be fitted with sacrificial anodes for additional corrosion protection.

The connector is available in nine standard sizes from 2 to 6 inches for 10,000 psi and 8 to 14 inches for 5,000 psi ratings, with special designs and sizes available on request.

Tel: +44 (0)1639 822555
Fax: +44 (0)1639 822623

Record lift capacity



Ingersoll-Rand claims to have developed the world's most powerful hydraulic chain hoist system – capable of lifting up to 400 tonnes. The first unit to be built will be used for blow out preventer (BOP) handling applications on a new drilling platform currently being built by one of the world's largest drilling contractors.

Previously, only hydraulic chain hoist systems based on individual hoists of up to 50 tonnes capacity have been utilised for BOP operations of this nature, typically in the North Sea or Asia, states the company. This new solution is based on four 100-tonne hoists, which can be operated in unison to provide the 400-tonne lift capacity or individually by a single operator from a central control console.

The BOP package is the first of three that will be delivered in 1999. The individual 100-tonne hooks lift in a BOP type arrangement with an articulated trolley allowing side-pulling operations at up to 20° to the vertical. Both lifting and travelling movements are said to be very quiet and smooth due to the use of hydraulic drives and controls.

Ingersoll-Rand sees its system having applications in the offshore market, cement plants, heavy industry, tunnelling and construction, as alternatives to high-cost cranes or other fixed-location, specialised lifting systems.

Tel: +44 (0)181 741 9828
Fax: +44 (0)181 741 9508

New dealer network for piping design software

Derby-based computer consultancy Fern is setting up a UK dealer network for COADE CADWorx piping design software. The modular suite of CADWorx software facilitates the creation of designs from basic piping layouts, through piping and instrumentation diagrams (P&IDs), to fully detailed systems incorporating data management using a central relational database. Product features include on-line editing of specifications, 2D and 3D functionality and fully functional bi-directional link with the industry standard Caesar II stress analysis product.

Tel: +44 (0)1332 780790
Fax: +44 (0)1332 780788

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

NEW Publications and Data Services

Gas to Europe: The Strategies of Four Major Suppliers*

Robert Mabro and Ian Wybrew-Bond (Editors) (Oxford Institute for Energy Studies, 57 Woodstock Road, Oxford OX2 6FA, UK). ISBN 0 19 730022 7. 288 pages. Price (hardback): £39.50.

This publication largely concerns the gas policies of Algeria, the Netherlands, Norway and Russia. It reviews how they have dealt with gas development in the past and how they are now dealing with the changing circumstances of their markets. It outlines how commercial objectives and political forces play an important role in determining the behaviour of these countries and their national oil companies Sonatrach, Gasunie, Statoil and Gazprom, and assesses how new developments will have far-reaching consequences for energy markets on the Continent.

The Kyoto Protocol: A Guide and Assessment

Michael Grubb, Christiaan Vrolijk and Duncan Brack (Royal Institute of International Affairs, Chatham House, 10 St James's Square, London SW1Y 4LE, UK). 256 pages. Price: £15.95.

This concise guide to the evolution, terms and implications of the Kyoto Protocol provides an economic and political account of key policy debates and their outcome. It also explains the meaning of provisions on emissions trading and other flexibility mechanisms, and provides a quantitative analysis using the emissions trading model developed at the Royal Institute's Energy and Environmental Programme. The final part of the book assesses the prospects for, and implications of, the Kyoto Protocol in the light of the outcome of the follow-up conference in Buenos Aires.

Oil in Deepwaters

Judith Gurney (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 84083 130 8. 185 pages. Price: £395 ($632).

This book, written by a regular contributor to *Petroleum Review*, assesses the opportunities and threats apparent in the exploration and production of deepwater oil. It compares the reserves potential and the production methods employed at three principal sites: the Aptian salt basin offshore Angola and further north along the West African coast, the Campos Basin off the southern shore of Brazil, and the US Gulf of Mexico. The book discusses the geographical requirements for deepwater reserves; the recent technological advances that have made deepwater exploration cheaper and more effective; and the factors that determine the choice of production system. It also looks at the ending of the Petrobras monopoly and looks at the players in the Gulf of Mexico.

Offshore Oil & Gas Directory 1999/2000*

(Available from Miller Freeman, Riverbank House, Angel Lane, Tonbridge, Kent TN9 1SE, UK). ISBN 0 86382 414 5. Price: Book – £97; CD-ROM – £113.98; Book and CD-ROM – £168.56.

Now in its 27th edition, this book (also available in CD-ROM format) provides detailed data, including telephone, fax, e-mail and web addresses, on over 7,000 oil and gas industry related companies in more than 11,800 different locations. Details can be found by product, service, company name or executive. Use of the CD-ROM allows the user to refine searches further by country. It is also possible to create and save information to shortlist folders, print out selected information, create enquiry faxes and direct dial or direct e-mail companies. The directory also includes an alphabetical listing of over 15,750 key industry executives as well as contact details for associations, conferences, exhibitions and courses.

** Available for reference only from the IP Library*

Latest from the Library

IP Statistics Service

The IP Statistics Service is now available via the IP website at **www.petroleum.co.uk** IPSTAT subscribers can access information using a given user-name and password which will be set up once the user subscription for 1999/2000 has been renewed. For those who do not have access to the Internet, hard copies will be sent out as before.

The service has been expanded and now includes:

- Quarterly press releases for the UK, Scotland and Northern Ireland – detailing demand for petroleum products, including petrol and end-use analysis for lubricants.
- Addresses – including pricing organisations, international oil associations, leading oil companies in the UK, etc.
- Statistics – including annual statistics on consumption and refinery production (a 10-year cumulation).
- Useful information – including a glossary of selected terms, petrol prices: 1902–1993, Opec historical crude prices.
- IP Publications Catalogue.

The service is priced at £80 (UK, Europe and other destinations). For more information, or to subscribe, please contact Sue Tse.

Recent additions to IP Library stock

- *Crude Oil Hedging: Benchmarking Price Protection Strategies.* Edward N Krapels, Michael Pratt. Energy & Power Special Reports, Risk Books, London, UK, 1998.
- *Fossil Fuel Resources in the 21st Century.* Peter R Odell. FT Energy, London, UK, 1999.
- *Guide to the Measurement of Mass and Weight.* First Edition. National Physical Laboratory, Institute of Measurement and Control, London, UK, 1998.
- *Oil & Gas Law Casebook.* Prof Samir Mankabady. Petroleum Economist, London, UK, 1999.
- *Petroleum and Natural Gas Industries – Design and Operation of Subsea Production Systems: Part 4: Subsea Wellhead and Tree Equipment.* BS EN ISO: 13628-4:1999. British Standards Institution, London, UK, 1999.
- *Petroleum Liquids – Manual Sampling.* BS EN ISO 3170: 1999. British Standards Institution, London, UK, 1999.
- *Statistical Review of Global LPG 1999.* MCH Oil & Gas Consultancy, Nuthurst, West Sussex, UK, 1999.

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IP Conferences and Exhibitions

International Conference and Exhibition on

Offshore Marine Support (OMS '99)

Southampton: 12–13 October 1999

A joint IP/ABR Company Conference

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.

The programme and registration form is now available

International Conference on

The Re-Use of Offshore Production Facilities

The Netherlands: 13–14 October 1999

Organised in association with the Association of Technology Transfer North Holland, Netherlands Energy Research Foundation (ECN), the IP Netherlands Branch, Aberdeen University Oil & Gas Institute and the Institute of Marine Engineers

The decommissioning of offshore facilities has been an emotive topic for the past couple of years. The debate has moved from dismantling to dumping, from recycling to recommissioning. The third in this series of international conferences, organised by the IP, focuses on the re-use of platforms and topside equipment.

The programme includes case histories and practical experience which will encourage companies to find alternative solutions to the disposal of redundant facilities.

The programme and registration form is now available

Workshop on

Health Effects of Fatigue on Performance

London: 21 October 1999

The Occupational and Environmental Medical Sub-Committee of the IP is organising this Workshop on the health effects of fatigue on performance. It will be restricted to 30 participants and will be of interest to health professionals in all sectors of the oil and related industries.

For more details or to book your place costing £100, please contact Jo Howard-Buxton at the IP on +44 (0)171 467 7127 or e-mail: jhb@instpet.co.uk

Business Seminar on

Opportunities in Canadian Oil and Gas

London: 9 November 1999 and
Aberdeen: 11 November 1999

Supported by

The Canadian High Commission and British Trade

The programme and registration form is now available

Autumn Lunch

Guest of Honour and Speaker: Dick Cheney
Chief Executive Officer, Halliburton Company, Former US Secretary of Defense 1989–93
Savoy Hotel, London: 15 November 1999

It is expected that many companies will purchase tables and maximise the opportunity to entertain guests at one of the key social events in the industry year.

The programme and registration form is now available

International Conference on

Developments in Measurement and Loss Control in Oil Refineries

London: 7–8 December 1999

During the six years which have passed since the last IP Conference on Refinery Loss Control, there have been significant changes in technology and management. The main areas of development have been data reconciliation and direct mass measurement. Other changes have resulted from the publication of the IP Guide to Hydrocarbon Loss Accounting and Control in Petroleum refinery operations and its extending use around the world.

This international two-day Conference aims to look at these developments, both the technology and its limits and to discuss the implications and application of the options that are becoming available to refinery management in the field of refinery loss control. Papers will include presentations from leading researchers and refinery operators detailing their experiences.

The programme and registration form is now available

Training Courses

For further information and a copy of the programme of 1999 Training Courses, please contact Nick Wilkinson in the IP Conference Department.

IP Week 2000: 14–17 February

The IP Week 2000 Annual Dinner will be held on Wednesday 16 February at the Grosvenor House Hotel. Tickets are limited and members are therefore advised to book early to avoid disappointment. Please note that applications can only be made on the official ticket application form which is published in this edition of *Petroleum Review*.

Programmes and registration forms for all events are available from:

Pauline Ashby, Conference Administrator, at the Institute of Petroleum

Tel: +44 (0)171 467 7100
Fax: +44 (0)171 255 1472
e: pashby@petroleum.co.uk

Membership News

NEW MEMBERS

Mr K Adetona, London
Mr A C O Amakiri, TMC Savings & Loans Ltd
Mr N Andrews, Simware Ltd
Mr K F Benny, London
Mr P J Brennan, Bedford
Mr M J Bridger, Benfleet
Mr M L Chan, Jaya Holdings Limited
Mr B H Coulson, B H Coulson & Associates
Mr S P Dean, London
Ms K L Dickens, Texaco Ltd
Mr O Ekomwenrenren, Nigeria
Captain J P Evanson, CA Marine Ltd
Mr R Everitt, ASCO UK Ltd
Mr A S Fares, London
Mr N C Fisher, Premier Oil Indonesia
Ms A George, London
Mr M C Hacking, Mocoh Energy Ltd
Mr C A Hughes, Rickmansworth
Dr A Hunt, Andrew Hunt Consultants Ltd
Mr M N Ibrahim, Schlumberger - Geoquest
Mr S L Kampani, India
Mr K G Leigh, Alan Cobham Engineering Ltd
Mr A U S Magamage, Hong Kong
Mr A W Mankin, Rhomax - ITS Ltd
Mr P Mason, Aylesbury
Mr F E McKenna, Catena Associates
Mr K F O'Shaughnessy, Sirpi Alusteel Construction
Mr F Perin, France
Mr D M Polden, Man Truck & Bus UK Ltd
Mr M R Powell, Brown & Root
Mr B Sin, PricewaterhouseCoopers
Mr M H Southwood, CRINE UK Ltd
Mr G J Tomkins, Petrola (UK) Ltd
Mr W Williamson, West Lothian

NEW STUDENTS

Ms R B Cooke, Warrington
Mr M B Noor, Pakistan

NEW CORPORATES

Mr M Charge, RAW Consulting, 68a High Street, Sandhurst, Berkshire, GU47 8ED, UK
Tel: +44 (0)1252 873 746 Fax: +44 (0)1252 875 684
e: spillscience@btinternet.com

Representative: Michael Charge
Environmental Consultants and Project Managers specialising in hydrocarbon spills and contaminated land investigation, assessment and remedial management. Industry leaders in the fields of spill management, groundwater investigation, commercial liability assessment, quantitative health risk assessment and risk based corrective action. Wide variety of clients across the petroleum, insurance, property, utility and government sectors.

NEW CORPORATES

Rich Group International Ltd, Room 3102, 31F, Tower Two, Lippo Centre, 89 Queensway, Hong Kong
Tel: +(852) 2501 0777 Fax: +(852) 2501 0111
e: auhowah@ibm.net

Representative: Howard Au, Managing Director

TankSafe Ltd, 4/5 Gough Square, London, EC4A 3DE, UK
Tel: +44 (0)171 583 2007 Fax: +44 (0)171 583 2008
e: tanksafe@lineone.net
Representative: Mr R J Quarmby, Business Dev. Mgr
Activities stem from decommissioning below ground kinks; pipework installations on retail and petroleum sites, small civil engineering works up to approximately £250,000. Tank lining, either to single skin or double skin facilities. Water removal from tanks without entry using fibre optic cameras.

Petroleum Institute of East Africa, PO Box 16540, Nairobi, Kenya
Tel: 249081, 250510 Fax:246179

Representative: Mrs Mary Kimotho M'Mukindia
Our mission is to be the best centre in East Africa for the advancement and dissemination of technical, economic and professional knowledge relating to the international oil and gas industry and to act as a forum for all with an interest in the petroleum industry for the advancement and safety of the industry.

Dewey Ballantine, 1 Undershaft, London, EC3A 8LP, UK
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Representative: Mr Mark Saunders, Partner
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Tel: +44 (0)1372 466036 Fax: +44 (0)1372 462542
e: pep@prime-group.com

Representative: Mr J Young, Director
Prime Energy Partnership – providing manpower and management solutions to the integrated power markets. Servicing the electricity, gas, oil and coal markets in all aspects of HR, personnel development and market planning for physical distribution and derivatives trading.
Prime Fuelling Systems – Environmental Audit of storage facilities to minimise pollution incidents. Design, and installation of fuel storage, monitoring and dispensing systems.

National Oil Inspection Services BV, Binnenbaan 33, 3161 VB Rhoon, PO Box 1010, 3160 AE Rhoon, The Netherlands
Tel: +31 10 5017255 Fax: +31 10 5018890
e: noisbv@wirehub.nl

Representative: MR D Groen, Manager

EVENTS Forthcoming

OCTOBER

5–6 **Moscow**
Pipeline Projects in Russia and CIS
Details: Jonathan Neale, CWC Associates
Tel: +44 (0)171 704 6742
Fax: +44 (0)171 704 8440
e: jneale@cwconferences.co.uk

5–8 **Kazakhstan**
KIOGE '99
Details: Odette Jonkers, ITE Press Office
Tel: +44 (0)20 7596 5253
Fax: +44 (0)20 7596 5111
e: press@ite-exhibitions.com

11–13 **Newcastle, UK**
Ageing Pipelines
Details: Stephanie Love, Institution of Mechanical Engineers, UK
Tel: +44 (0)171 973 1312
Fax: +44 (0)171 222 9881
e: s_love@imeche.org.uk

12–13 October
Southampton, UK: *International Conference and Exhibition on Offshore Marine Support*
Details: Pauline Ashby, The Institute of Petroleum

12–14 **Beirut**
5th Annual Middle East Gas Summit '99
Details: IBC Asia Ltd, Singapore
Tel: +65 732 1970
Fax: +65 733 5087
e: rochelle@ibcasia.com.sg

13–14 October
The Netherlands: *Re-Use of Offshore Production Facilities*
Details: Pauline Ashby, The Institute of Petroleum

13–15 **Cape Town, South Africa**
6th Annual Indaba Africa Upstream '99
Details: Global Pacific & Partners Pty Ltd, South Africa
Tel: +27 11 782 3189
Fax: +27 11 782 3188
e: global.pacific@pixie.co.za

16–19 **Dubai, UAE**
Arab Oil & Gas Show
Details: International Conferences & Exhibitions Ltd, UK
Tel: +44 (0)1442 878222
Fax: +44 (0)1442 879998
e: david@ice-ltd.demon.co.uk

18–19 **London**
Liquefied Natural Gas '99
Details: IBC Global Conferences Ltd, UK
Tel: +44 (0)171 636 6858
Fax: +44 (0)171 453 2058
e: cust.serv@ibcuk.co.uk

18–20 **London**
F-Cells '99, Fuel Cell Technology
Details: IQPC, UK
Tel: +44 (0)171 430 7300
Fax: +44 (0)171 430 7301

19–20 **Budapest, Hungary**
2nd Central and East European Refining & Petrochemicals Roundtable
Details: World Refining Association, UK
Tel: +44 (0)1242 529090
Fax: +44 (0)1242 529060

19 **London**
OPAL European Oils Forum
Details: Rachel Wilbourn, Energy Information Centre, UK
Tel: +44 (0)1638 751400
Fax: +44 (0)1638 751801
e: info@eic.co.uk

19–21 **Stavanger, Norway**
11th Annual Deep Offshore Technology
Details: Frances Leon, DOT Event Manager, London
Tel: +44 (0)181 892 8096
Fax: +44 (0)181 744 9932

26–28 **Rotterdam**
Pumps & Valves '99
Details: Mr M A A Peka, Technotrans BV
Tel: +31 10 234 10 82

27–28 **Geneva**
Investing in Algeria's Energy and Mining Opportunities
Details: Poppy Griffin, CWC Associates
Tel: +44 (0)171 704 6161
Fax: +44 (0)171 704 8440
e: poppy@cwconferences.co.uk

28–29 **Aberdeen**
Focus on Controlling Hydrates, Waxes and Asphaltenes
Details: IBC Global Conferences Ltd, UK
Tel: +44 (0)171 636 6858
Fax: +44 (0)171 453 2058
e: cust.serv@ibcuk.co.uk

29–1 Nov **UK**
Understanding the Fundamentals of the Oil Industry
Details: Petroleum Economist Ltd, UK
Tel: +44 (0)171 831 5588
Fax: +44 (0)171 831 4567

31–2 Nov **Dubai, UAE**
Pipetech '99
Clare Smith, International Exhibition and Conference Organisers, UAE
Tel: +971 4 362900
Fax: +971 4 362988
e: dxbrai@emirates.net.ae

NOVEMBER

1–5 November
Newbury, Berks: *Operations Practice in Supply Trading*
Details: Nick Wilkinson, The Institute of Petroleum

1–2 November
London: *Introductory Financial Accounting for Petroleum Companies*
Details: Nick Wilkinson, The Institute of Petroleum

2–3 **Vienna**
Oil and Gas Transportation in the CIS Major Pipeline Projects
Details: Energy Exchange Ltd, UK
Tel: +44 (0)1242 529090
Fax: +44 (0)1242 582147/529060

1–3 **Paris**
Iraq Petroleum Summit '99
Details: SMi Ltd, UK
Tel: +44 (0)171 252 2222
Fax: +44 (0)171 252 2272

2–3 **The Netherlands**
1st Shell Industrial Water Management Conference
Details: Paul Mak/Heidi Nijboer
Tel: +31 20 630 2209/2127
Fax: +31 20 630 2003
e: Water99@opc.shell.com

3–4 November
London: *United States SEC and FASB Accounting and Reporting for Petroleum Companies*
Details: Nick Wilkinson, The Institute of Petroleum

9 November, London;
11 November, Aberdeen: *Opportunities in Canadian Oil & Gas* Details: Pauline Ashby, The Institute of Petroleum

IP Discussion Groups & Events

Energy, Economics, Environment

'Looking at future developments of hydrocarbon outlets in the eastern Caspian regions'

Tuesday 12 October, 17.00 for 17.30 until 19.00

Vittorio Jucker, Director Natural Resources Group, European Bank for Reconstruction & Development

IP Contact: Jenny Sandrock

London Branch

'Future role of independent storage in UK and Europe'

Thursday 14 October, 17.30 for 18.00

Richard Kellaway, Managing Director, ST Services Ltd

Tea will be served beforehand and light refreshments afterwards

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

Energy, Economics, Environment

'What's so important about fuel prices?'

Thursday 28 October, 17.00 for 17.30 until 19.00

Steve Norris, former Director General, The Road Haulage Association Ltd

IP Contact: Jenny Sandrock

Energy, Economics, Environment

'OPEC's policy dilemmas'

Wednesday 10 November, 17.00 for 17.30 until 19.00

Dr Leo Drollus, Centre for Global Energy Studies

IP Contact: Jenny Sandrock

Energy, Economics, Environment

'West of Shetland revisited'

Thursday 18 November, 17.00 for 17.30 until 19.00

John Brooks, Director and Head of Exploration and Licensing, Oil and Gas Directorate, DTI

IP Contact: Jenny Sandrock

IP THE INSTITUTE OF PETROLEUM

Press Release

New technical guidance for safer petrol filling stations

Petrol is a very dangerous and highly polluting substance which requires proper storage and handling if it is not to pose significant risks to the health and safety of people and to the environment. This is particularly important at petrol filling stations, where the general public serve themselves. New technical guidance is now being published which sets out how to avoid damage and pollution by following good design, construction and installation principles, and by taking advantage of the latest advances in technology.

Guidance for the design, construction, modification and maintenance of petrol filling stations (ISBN 0 85293 217 0) is being published jointly by the Association for Petroleum and Explosives Administration (APEA) and the Institute of Petroleum (IP). The guidance has been compiled by working groups of experts cooperating under the auspices of a technical coordinating body comprising representatives from all relevant areas of industry and enforcement.

This technical coordinating body was established following a request from the Health and Safety Executive to develop a replacement for the outdated guidance HS(G)41. A Government deregulation initiative had already identified the need to move from a prescriptive style of regulation to a risk-based approach common to other industries dealing with hazardous substances.

The new guidance, which should be read in conjunction with the HSE guidance note on risk assessment HS(G)146, is based on good practice and reflects the latest state of knowledge in the industry. It is designed to protect people and the environment from harm.

Guidance for the design, construction, modification and maintenance of petrol filling stations is specifically aimed at designers, contractors and installers, but the document will also be invaluable to enforcement authorities, developers, owners and planners of petrol filling stations.

Both the APEA and the IP consider this new guidance to be of such importance that they are making copies available to their members at especially attractive rates. APEA and IP Members should quote their Membership Number when making enquiries.

The document, which exceeds 200 pages, is priced at £90. Orders can be placed with Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK. Tel: +44 (0)1206 796 351, Fax: +44 (0)1206 799 331, e: sales@portlandpress.com

For more information about APEA write to: Association for Petroleum and Explosives Administration, PO Box 572, Barton-le-Clay, Bedfordshire MK45 4QW, UK. Tel: +44 (0)1582 882753, Fax: +44 (0)1582 882754, e: admin@apea.org.uk

***For more information about the Institute of Petroleum see our website:* www.petroleum.co.uk**

MOVES People

Dennis Rosborough, Director of Studies at the College of Petroleum and Energy Studies, has retired. He is succeeded in the role by **Elizabeth Pinfold**, formerly of BP Oil Europe.

Rob Parsons has been appointed Director of Card Clear plc, supplier of credit card fraud prevention and card transaction services. Parsons joined the Group in February 1998 and is currently Managing Director of Card Clear (UK) plc.

Sami Fahed Al-Rushaid has resigned from the Board of Directors of Santa Fe International Corporation to accommodate additional responsibilities resulting from his recent promotion to Deputy Chairman of the Board of Kuwait National Petroleum Company.

Shell UK Exploration and Production has announced that **Mark Hope** has been appointed to the position of External Affairs Director. Hope was until recently Vice-President of UK Offshore Operators Association and Technical Director of Enterprise Oil. He is also a member of the Government-appointed Oil and Gas Industry Task Force where he has been industry co-sponsor of the Sustainable Development and Environment Workgroup as well as Chairman of Brindex.

ABS has announced several personnel changes in its Asia-Pacific Division. **Mark McGrath** has been appointed Country Manager for Korea following the retirement of **Karl Stromer**. McGrath was previously Country Manager for the Philippines where **Roger Del Valle** will take on this role. Del Valle moves from the Korea office and will be based in Manila. **SS (Andre) Han** has been appointed Country Manager for Malaysia and Brunei and replaces **Robert Wise** in the Kuala Lumpur office following the transfer of Wise to Assistant Chief Surveyor at the company's world headquarters in Houston. **Soon Ick Hong** will replace Han as Marketing Director in Korea. **Michael Wheatcroft** has been appointed Director of Technology and Business Development, Southern Region, ABS Pacific. He will have particular responsibility for the offshore sector and will be based in Singapore. **William Backshell** has been appointed Country Manager, Australia, transferring from the Society's Fremantle Office to the principal office in Sydney. Backshell replaces **Jim Lawler** who died tragically while competing in last year's Sydney to Hobart yacht race.

The UK Office of Gas and Electricity Markets (Ofgem) has announced the appointment of three new Directors. **Gill Whittington** is to be Chief Operating Officer and was formerly Director of Strategy at Guys and St Thomas' NHS Trust. **Charles Coulthard**, currently Deputy Director General at Ofreg will become Deputy Director General, Scotland, and **Sarah Harrison** is to be Director of Public Affairs. Harrison joins from ICSTIS, the premium rate telephone services watchdog, where she holds the role of Director.

Former Chairman of Shell, **Sir Bob Reid** became Non-Executive Chairman of the International Petroleum Exchange following the resignation of Lord Fraser of Carmylie who resigned last month. Reid is also Chairman of British-Borneo.

Andries Boon **has been promoted to Business Manager of Zeolyst International's speciality catalysts business. He will be based in Woking, UK with worldwide responsibilities.**

Doug Bell **has been appointed Sales Manager – Far East and Middle East Regions for BJ Tubular Services. Previously Bell served as Operations Manager of Hammer Services – Far East Region for the division.**

Archie W Dunham has been named Chairman of Conoco Inc succeeding **Edgar S Woolard** who has resigned. Dunham will continue to be President and Chief Executive as well as Chair of the company's Board.

Wincanton Logistics has appointed **David Godsell** as new Business Development Director for its Industrial and Commercial division. Godsell joins from Exel Logistics where he had the role of Business Director.

Petrocorp Inc has named **Gary R Christopher** President and Chief Executive Officer, replacing **W Neal McBean**. McBean will remain on the company's Board.

Brindex has announced the appointment of **Ian Craig** as its new Chairman. Craig, General Manager, UK/Ireland at Enterprise Oil, assumed responsibility on 1 September 1999. His appointment follows the departure of current Chairman **Mark Hope** from Enterprise Oil to Shell Expro.

Andrew Campbell, the former Head of Energy at Simmons & Simmons, has joined the Morgan Cole Energy Group. Campbell will be one of the firm's lead partners in the Construction and Engineering Group but he will be concentrating his efforts on expanding the firm's presence in the contentious and non-contentious side of major energy projects.

The Repsol SA Board of Directors has put into place a new corporate structure establishing the first line of management for the new Repsol–YPF Group. **Roberto Monti** and **Carmelo de las Morenas** will join the Executive Committee while **Bernard Gremillet** has been appointed Corporate Director of R&D, Environment and Engineering, and **Ramón Pérez Simarro** becomes Corporate Director of Information Systems. **Mario Rosso** has been appointed Director for Europe, North Africa and the Rest of the World, and **Rubén Patritti** has been appointed Director for Latin America. In the refining and marketing areas, **Jorge Segrelles** has been appointed Director for Europe, and **Juan Pedro Maza**, Director for Latin America. **Juan Badosa** was appointed Director in charge of the LPG sector worldwide and **Miguel Boyer** was made President of CLH, with **Eduardo Llorens** as his Managing Director.

Manrochem has appointed **Colin Webb** to the newly created position of Sales and Marketing Director to spearhead its planned expansion into new market sectors. Webb has over 30 years' experience in business development in the process engineering contracting and equipment supply industries. The current Sales and Marketing Manager, **Peter Knowles**, will continue in his current position.

The Transport Association has appointed transport industry specialists **Peter Acton Associates** to manage its affairs after 52 years of using Robson Rhodes as its Secretariat.

IP THE INSTITUTE OF PETROLEUM

Annual Dinner 2000
Grosvenor House, Park Lane, London W1

Wednesday 16 February 2000 at 18.45 for 19.30

- **Tickets can only be purchased by Individual Members and Corporate (Company) Members of The Institute of Petroleum (IP).**
- **The cost of a ticket is £137 plus 17.5% VAT for Individual Members and for the nominated representative of Corporate Members, and £187 plus 17.5% VAT for their non-Member guests. Full payment must be received before tickets can be guaranteed.**
- **Individual Members may apply for a maximum of five tickets. Corporate Members may apply for individual tickets, or for one or more complete tables of 10 places.**

It is the responsibility of applicants to establish whether or not their guests are Individual Members. Corporate Members should note that only the company's nominated representative to the IP is entitled to the member rate, other employees or guests must be paid for at the non-Member rate, unless they are Individual Members in their own right.

- **Applications should be made by completing the form below and sending it to The Institute of Petroleum, with the full remittance, by Friday 22 October 1999. Applications received after 22 October 1999 will be considered separately.**
- **Companies or individuals wishing to share tables must state this when completing the application form, as changes cannot be made after tickets have been allocated.**
- **Tickets will be allocated and mailed during the week of 8 November 1999. Please note that the IP may be unable to meet requirements in full, and we suggest therefore that you do not invite guests until you have received your tickets. *In the event that the Dinner is oversubscribed, allocation of tickets will depend on the degree of the applicant's involvement in IP affairs, and a waiting list will operate. Full refunds will be made as appropriate.***
- **Successful applicants should submit a confirmed guest list to the Institute of Petroleum by Friday 21 January 2000 at the latest. Names submitted after this date will not be included in the printed programme.**
- **In the event of cancellation, a refund less a 20% administration charge of the total monies paid will be made provided that notice of cancellation is received in writing on or before 7 January 2000. No refunds will be paid after this date.**
- **Dress is black tie with decorations.**

The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK.
Tel +44 (0)207 467 7100 Fax +44 (0)207 255 1472

TICKET APPLICATION FORM

IP THE INSTITUTE OF PETROLEUM

Annual Dinner 2000
Grosvenor House, Park Lane, London W1
Wednesday 16 February 2000

To: Pauline Ashby, Conference Administrator, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK. Fax: +44 (0)207 255 1472

I wish to order _____ ticket(s) and enclose my remittance*, made payable to *The Institute of Petroleum*.
My application is made as an Individual Member/a Corporate Member (delete as appropriate).

Individual Members _____ ticket(s) @ £137 each = £ _____

Non-Members _____ ticket(s) @ £187 each = £ _____

+ 17.5% VAT = £ _____ Total= £ _____

Name _____ IP Membership No.** _____
BLOCK CAPITALS

Company _____ Address _____

_____

Tel/Switchboard _____ Tel Direct _____ Fax _____

Signature _____ Date _____
I confirm that I have read and agree to the terms and conditions detailed above.

PLEASE PHOTOCOPY THIS FORM

* Payment should be made by sterling cheque or draft drawn on a UK bank. This is not a tax invoice.
** Please telephone the IP Membership Department if unknown.

Minale Tattersfield Design Strategy

International Design Consultants for the Energy Sector

OFFICES IN: LONDON, PARIS, MILAN, ZÜRICH, PRAGUE, CASABLANCA, KUWAIT, JEDDAH, U.A.E., KUALA LUMPUR, HONG KONG, OSAKA, TOKYO, BRISBANE, SYDNEY, BUENOS AIRES, RIO DE JANEIRO.

▲ *Petrol station design for IP, Italy*
▼ *Prototype of totem sign for IP*

▼ *Canopy and totem detail for IP, Italy*

Minale Tattersfield has 35 years' experience in petrol station design and has worked internationally for companies including BP, Agip, IP, YPF, Total, Afriquia, Elinoil, Thai Oil, Hydro and Texaco, among others.

In the area of transport design, we have also completed major projects for London Transport, BAA, and Eurostar train.

Speed is essential in the redesign and refurbishment of petrol stations to minimise loss of revenue, however consulting and coordinating specialist design consultancies for each individual area can be time consuming.

Minale Tattersfield offers a one stop service, with the experience and expertise to manage your complete project efficiently, from initial concepts through to final completion.

We have specialist skills needed for each area of the complex process of petrol station design.

- Graphic design for brand identity and signage,
- Architectural / urban design for the building, canopy, and surrounding landscape,
- Industrial design for petrol pump, car wash, lube bay, self-standing structure,
- Packaging design for lube products,
- Retail design for convenience store.

▲ *Corporate identity for Elinoil, Greece*

▲ *Corporate identity and livery for Eurosta*
▼ *Hammersmith tube station*

▲ *Packaging for BP*
▼ *Interior of Heathrow Express*

▲ *Proposal for Heathrow Express*
▼ *Identity for IP's self-service stations*

▲ *YPF Petrol station contract with Minale, Tattersfield, Piaton & Partners*

▲ *Livery for Elinoil, Greece*

▲ *Petrol station design for Elinoil, Greece*
▼ *Mintat petrol station designed for Agip*

mintat *for AGIP*

TRANSPORTABLE PETROL STATION

The Mintat (AGIP) petrol station is ideal for areas where environmental constraints restrict the building of permanent stations. Costing considerably less than a permanent petrol station, it is well suited to sparsely populated rural areas in developing countries. It can be used to reduce loss of revenue during the refurbishment of station networks and accommodate the seasonal flow of traffic in tourist areas and at large sporting events.

A transportable, fully autonomous petrol station, built on a modular, container based system of inter-connectable units which can be installed and fully operational in 48 hours. It complies with the latest environmental legislation including a vapour recovery system during discharging and filling and guarantees maximum operating safety. The tanks have a capacity of between 22,000 and 44,000 litres to distribute two types of petrol and diesel if required.

The standard modules of the transportable service station are composed of:

- *Tank Section*
  Size 2.4z
- *Office Section*
  Size 2.40 x 9.20 x H 3.30 m.
- *Canopy*
  Size 9 x 3.60 x 1.3 m.
- *Service Ramps*
  Size 14 x 3.2 x 0.3 m.
- *Set of External Trimmings*
  Outer fascia, modular cladding panels, tubular protection, outside illumination.
- *Utilities Plants*
  Electrical plant and earthing system, lighting plant, fire fighting system, heating plant, fuel dispenser and control system.

- *Signs*
  Two illuminated signs with trademark and company logo, two signs on the fascia, one pricing panel.
- *Furnishings and Accessories*
  Internal furnishings, shelves, W.C. service.

- *The MINTAT MARK II,* incorporating a four hour fire rated tank assembly meeting SWRI 95-03 & 93-01, UFC Standard A-11-F-1 (79-7) and NFPA 30 & NFPA 30A is in the final stages of development.

Your company livery can be applied as illustrated below.

For further details, contact:

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