petroleum review

EDITORIAL

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The Institute of Petroleum as a body is not responsible either for the statements made or opinions expressed in these pages.

Those readers wishing to attend future events advertised are advised to check with the contacts in the organisation listed, closer to the date, in case of late changes or cancellation.

The Institute acquired its crest, designed by the College of Heralds, in 1949. Its motto, 'Conjunctione Potiores' (strength through unity), supports a shield portraying the Archaeopteryx, an avian fossil found in Jurassic strata similar in age to important oil-bearing formations in the North Sea.

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Contents

Letter from the Editor:

As *Petroleum Review* continues to expand its coverage of news and events, I thought it might help future contributors, as well as readers, to have some foreknowledge of special topics of interest in forthcoming issues.

In the October issue we expect to cover onshore upstream in UK/Europe as well as a special feature on Subsea. November will feature Pipelines and Microbiology, while December will centre on Natural Gas and International Aviation Bunkering. In addition of course we will continue to deal month by month with major news as it arises — for example, the Woodside LNG project will be featured on commissioning, ahead of the natural gas conference report scheduled for the December issue.

Next year 1990 the features list will include:

1Q International Oil Supply and Price: Forecourt UK Preview: Shipping and Shipbuilding: Forecourt UK Review

2Q Bulk Storage: Europe Energy: Oil Pollution: Refining/Product Quality

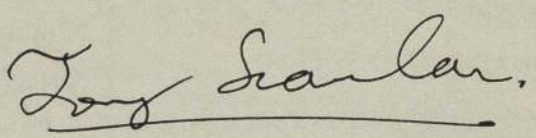
3Q Bulk Storage Review: Onshore Europe: Pipelines, Offshore UK, Europe

4Q Subsea: Oil Measurement: Natural Gas: Microbiology: International Bunkering.

Environmental issues are likely to be especially debatable, even controversial; and while special attention will be given to these in the second and fourth quarters, the letters column is there for those wishing to take up an issue without resorting to a major article.

Advertisers please note that a more detailed list by month is in the media pack available from Jim Slater, our advertising manager at Jackson-Rudd & Associates (see contents page). A separate media pack for those interested in recruitment advertising is available from Derek Amner at MB advertising (q.v.)

I would also like to remind readers that comments and letters on any of the feature articles or suggesting new areas of interest are welcome, and, subject to the usual 'editor's discretion' may be considered for whole or partial publication.



Headlines

10 July

The National Iranian Oil Company's procurement arm, Kalanaft, is considering opening an oil equipment and services procurement office in Calgary, Canada.

Repsol and Pemex have resumed negotiations which were abandoned in March, on a long-term crude oil supply agreement.

11 July

Amoco Corp plans to pull out of Jordan after drilling two unsuccessful oil wells in the past three years.

Norway is set to become Europe's leading oil producer by 1994. Nomura Research says that Norwegian output will rise above 600m barrels in 1991 and will overtake the UK in 1993 to 1994.

13 July

The Petrochemical Industries Company of Kuwait has chosen a process developed by Union Carbide Corp and Shell Oil Co to make polypropylene at a plant to be built in Kuwait.

An expected doubling of jet fuel demand at Amsterdam's Schipol airport by the year 2020 has prompted the decision by 10 oil companies to replace barge delivery from Rotterdam with a new 57km pipeline.

14 July

Taiwan has signed a one-year contract with the state of Alaska for the import of 3,200b/d of US crude after outbidding other competitors in June.

17 July

The Nigerian National Petroleum Corporation have signed a contract to sell more than 4m tonnes of LNG a year to Europe and the US from 1995.

Wearne Brothers Ltd agreed to set up a joint venture company with BP Singapore Pte Ltd to develop and operate a LPG plant in Singapore.

18 July

Iran will export 6m tons of crude oil to Turkey in 1989.

19 July

Oil Production from the British sector of the North Sea in June was at its lowest since March 1979, with Norway producing more for the first time in eight and a half years. The fall was due to maintenance closure and unscheduled closures because of damage.

Occidental has increased its Malaysian exploration acreage by signing a new production-sharing contract with Petronas. The agreement covers the 17,000 square kilometres SK-8 block off Sarawak.

According to the latest forecast from the Harvard University Energy and Environmental Policy Centre, world oil prices will rise steadily during the next decade, perhaps reaching $50 a barrel by the year 2000.

20 July

Clyde Petroleum's 18% in Goal has been sold to a wide range of institutional investors. The deal raises £23.5m for Clyde.

Union Texas Petroleum Holdings Inc announced a natural gas discovery in the Badin area of southeastern Pakistan.

21 July

British Petroleum is to move its corporate headquarters from Britannic House after 22 years to nearby Lutyens House.

British Gas has found oil in Ecuador in the southern Oriente Basin jungle area. Testing would be needed to determine the significance of the find.

24 July

The Argentine Government plans to merge the state oil, coal and gas companies in an effort to cut losses that may total a combined $1.5bn in 1989.

25 July

Conquest Exploration Co said it signed an exploration and production sharing agreement with the government of the Sultanate of Oman that covers 1390 square kilometres in the Jebel Aswad.

A combination of pipeline maintenance, seasonal cutbacks and possible effects of the miners strikes could affect exports of oil from the USSR this summer.

26 July

Occidental's latest North Sea oil find, just west of the Claymore field is estimated to contain 35m barrels of recoverable oil.

Production has begun at the Hidra oilfield, Argentina and a decision is imminent on development of the neighbouring Ara gas field.

Soviet and Iranian authorities have agreed a 3bn cubic metres a year natural gas deal, with deliveries expected to start in 1990.

27 July

Petrobras has lost $400m on sales of imported oil products since January, as a result of government efforts to curb fuel prices.

Sweden is to buy an additional 500m cubic metres of natural gas a year from Denmark. Swedegas confirmed that it would boost imports of Danish gas from the present 600m cubic metres a year to 1.1bn.

28 July

Petrobras believes it has discovered a 125m barrel oil field alongside its Marlim field in the deep waters of the Campos basin.

31 July

British Gas has disclosed plans to sell gas in the continental and American markets and has revived speculation about building a pipeline across the Channel to hook into the European network.

Amoco has signed an agreement to explore for oil in Poland.

Neste Oy widened its presence in Portugal with a deal to buy most of the state plastics firm Epsi. Neste will also lease the ethylene plant of CNP for 15 years at a cost of £35m annually plus about 50% of cash flow.

1 August

The IPE is planning to introduce an unleaded petrol futures contract by the spring of 1990.

Occidental has struck commercial quantities of oil near Islamabad in a joint venture between Pakistan's State Oil and Gas Development Corporation.

Oiltanking GmbH is about to establish a US$53m Suezmax tanker terminal in Singapore. The terminal will provide a heavy fuel oil, gasoil, jet fuel and gasoline facilities for a third party use in its first phase.

2 August

UK sales of diesel cars are growing strongly — in the first six months of 1989 they rose by 20.4% to 61,039 from 50,691 in the first half of 1988.

The UK is on course to hit its target of making energy savings worth £7bn by 1995.

Brazil has signed a 25 year contract eventually to be worth $250m and $300m a year for electricity supply from Bolivia's gas fields. The contract involves the equivalent of 3.5m cubic metres of gas a day.

3 August

An investigation into the pollution hazard posed by tarmac roads has been launched by the UK Department of the Environment as part of a wider study into the cause of smogs.

Shell Oil Co said it will begin construction on a new catalytic cracking unit at its Norco refinery, USA to replace one destroyed by a 1988 explosion.

The US Justice Department has launched an antitrust probe into allegations that several major oil companies conspired to hold down reported prices of West Coast crude to evade federal taxes and royalties owed to state governments.

4 August

Amerada Hess aims to spend £27m this year on exploration in the UK sector as part of £124.1m capital expenditure plan.

Exxon said it has teamed with companies in the Soviet Union, Kuwait, France and the US to seek oil exploration rights in the border area between North and South Yemen.

7 August

The Nigerian National Petroleum Corporation is putting together joint venture agreements with about 12 foreign oil firms with facilities to store, refine, and market Nigerian crude abroad.

Atlantic Richfield confirmed that it had made one of the biggest oil discoveries in the US for the past decade. The company said that its second delineation well drilled at Point McIntyre indicated a field of about 300m barrels.

8 August

Clarion Petroleum, a British independent oil company, has successfully concluded negotiations with Equatorial Guinea for a 500,000 acre production sharing contract in the south of the country.

9 August

The British Petroleum Co. PLC is withdrawing from oil exploration off the coast of the Republic of Ireland and looking for buyers for its licence interests there.

Sovereign Oil and Gas has been awarded licences in five Italian onshore blocks for which it will act as technical operator.

Australia's 'lonely gas' exports

This month sees the inauguration of a set of superlatives in Australia. The country's prime minister, Bob Hawke, will be inaugurating the country's largest ever single commercial venture and largest construction effort, the A$12bn liquified natural gas (LNG) plant in the remote northwest of Western Australia. Once termed 'the loneliest gas in the world', Australia's North West Shelf Gas Project has already resulted in LNG exports to Japan two months ahead of schedule.

LNG sales to its sole customer, Japan, are expected to top 6 million tonnes annually by 1993, by which time gas will enjoy the same importance as Australia's other main export commodities, wool and iron ore. Over the next 20 years, Australia hopes to earn $50 billion through its LNG exports.

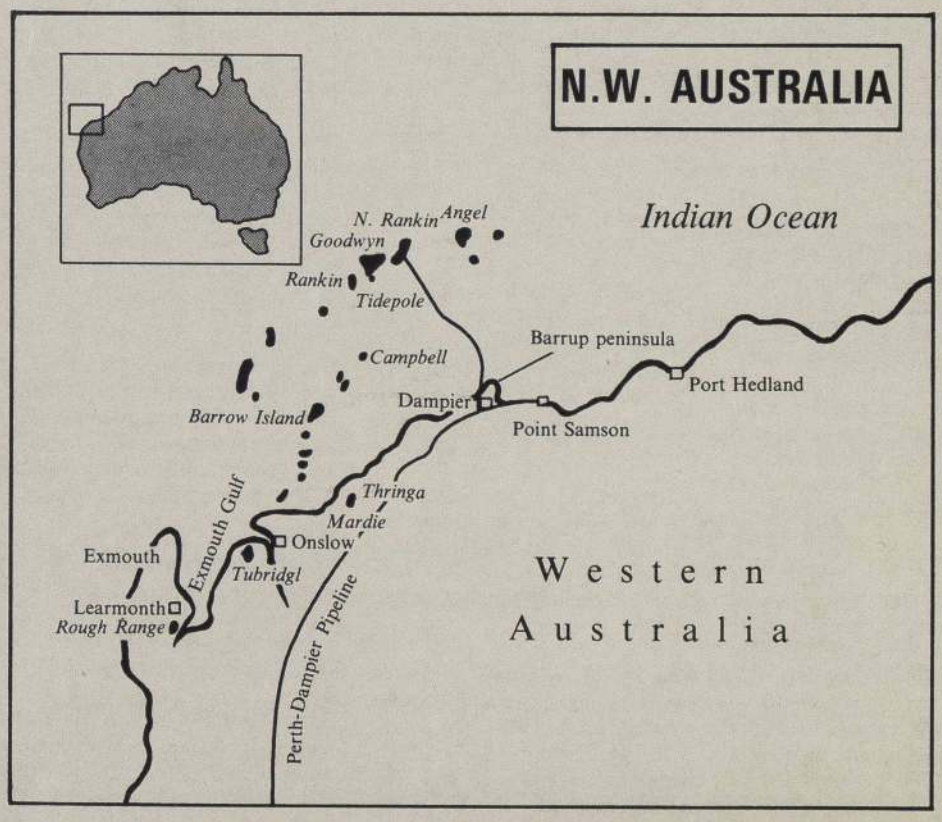
The LNG phase of the North West Shelf Project was implemented in 1985 by its six equal participants, Woodside Petroleum Ltd (project operator), BHP Petroleum Pty Ltd, BP Developments Australia Ltd, Chevron Asiatic Ltd, Japan Australia LNG (MIMI) Pty Ltd and Shell Development (Australia) Pty Ltd.

Apart from construction of the liquefaction plant on the Barrup peninsula, two further offshore production facilities were envisaged along with connecting submarine pipelines and a supporting infrastructure designed to cater for the 6,000 or so construction workers and project staff involved.

So far all has gone smoothly. Seven purpose-built ships, each with a capacity of 125,000 cubic metres, were needed to transport the LNG at temperatures of −160°C. The first of these, the Northwest Sanderling, was completed earlier this year in Japan and it carried the first delivery from Australia in June. The second tanker, Northwest Swift, is expected to go into service in September.

The North Rankin field 130km off Dampier is at present feeding the liquefaction plant on the Barrup peninsula. It has been developed around a single platform, North Rankin A, which has the largest offshore production capacity of any offshore platform in the world. Work on the second platform, which is located in the Goodwyn field is already underway with production expected in 1993. The third offshore platform is still a long-term possibility.

The viability of the LNG project has been due to a growth in demand for LNG in Japan. The customers are all Japanese public utilities, which rely on LNG for 22 percent of power production. The buyers are the electric power companies of Tokyo, Chubu, Kansai, Chugoku and Kyushu as well as Tokyo Gas, Osaka Gas and Toho Gas. The LNG project went ahead after the long-term supply deals into the year 2008 had been finalised.



Bush plan gets thumbs down

Charles J DiBona, President of the American Petroleum Institute (API) has attacked President Bush's clean-air proposal requiring methanol-powered cars to reduce certain smog-causing pollutants, saying it could add to public health risks without significantly improving air quality.

DiBona told a subcommittee of the House banking, finance and urban affairs committee that consumers will pay more per mile for methanol than gasoline, will need to fill up more frequently because methanol burns less efficiently, and may have more problems starting their cars in cold weather because methanol needs more heat to start burning.

'Under a methanol mandate, consumers would have to bear these costs and yet not receive a significant overall improvement in air quality', DiBona said.

DiBona also said limited domestic supplies of natural gas (the cheapest source for methanol) meant Bush's proposal could undermine national security because extra supplies would come, at least in part, from the Middle East, thus adding to US dependence on an unstable region.

KBC export award

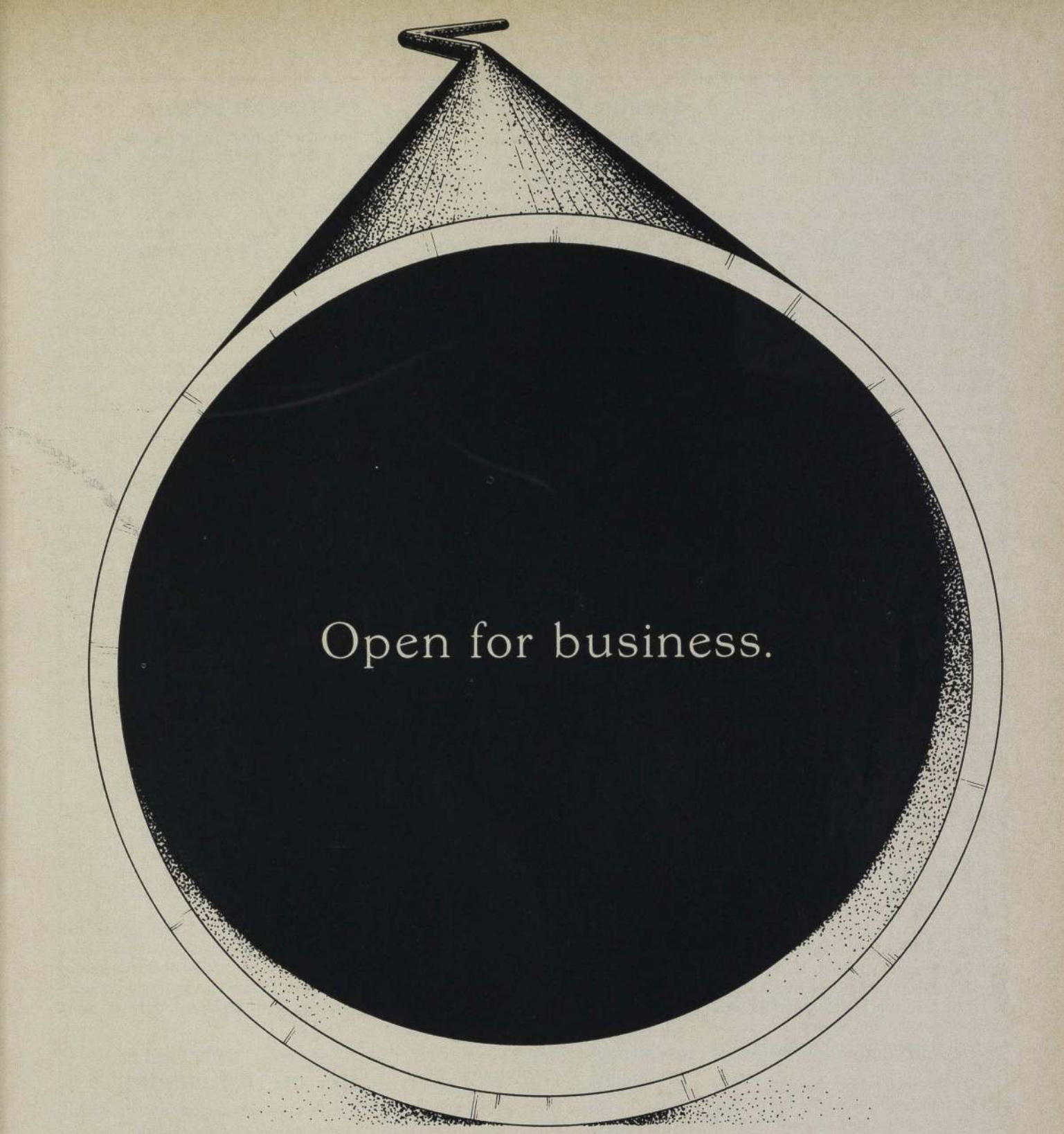
KBC Advanced Technologies Limited has received The Queen's Award for Export Achievement. The Award is conferred on companies which have demonstrated outstanding success in winning export sales.

KBC is an independent international consulting and high technology organisation, which specialises in improving profitability in oil refining and other process industries such as petrochemical, chemicals, food, beverage and pharmaceutical.

Services and technology have been provided to over 140 oil companies in 34 countries, amongst other clients.

Last year, KBC launched the highly successful PETROFINE modelling system as part of its integrated technology and services aimed at upgrading refinery performance. PETROFINE provides representation of a whole refinery plant or particular elements of the plant from crude oil to blended finished products. It adds unit by unit simulation, constraint capabilities, time period analysis and inventories.

The system is designed to allow the refiner to simulate a model for his particular refinery, then to monitor and optimise performance of his plant under an extremely variable range of conditions.



The extensive national pipeline network laid down by British Gas to carry supplies to its millions of customers is available for the transport of gas on behalf of independent gas suppliers.

British Gas is pleased to offer this service, which can respond flexibly to the needs of the developing market for gas transportation.

Details of the service and information about likely costs have been published, and are available from the Gas Transportation Services Department, British Gas, 100 Rochester Row, London SW1P 1JP. Telephone 01-821 1444.

British Gas
ENERGY IS OUR BUSINESS

Texaco wait

Most major oil companies have jumped the gun and introduced super unleaded petrol far too early, say Texaco.

The oil company was the first to achieve full availability of the premium (95 octane) unleaded grade, but Texaco now believes that consumers are still confused about the original grade of unleaded and that the new, expensive grade will only muddle them further.

Roger Colomb, Texaco's Managing Director, said, 'The point of introducing unleaded at 95 octane was to provide the optimum solution in terms of efficiency and value for money, and minimise energy wastage at the manufacturing and distribution stages.

He added, 'We recently commissioned a market survey with the RAC which showed that nearly 60 percent of car owners still don't know if their cars can use premium (95 octane) unleaded. That's evidence enough to indicate that our competitors have got the introduction and timing of super unleaded wrong.

'It is also not true that putting super unleaded in a car designed or tuned to run on the current premium unleaded will in any way improve performance. If motorists are using super unleaded because they believe this, they are wasting their money', he said.

IPE's fuel oil launch

The International Petroleum Exchange of London launches a heavy fuel oil contract on Tuesday, 5 September 1989 with October 1989 as the first delivery month.

The contract will be cash settled against the IPE's fuel oil index which will be published and issued at 12 noon each day. The index is calculated by taking the mean of cash market assessments from the previous day for barges and cargoes for high sulphur fuel oil in North West Europe.

The contract has been designed to provide oil trade users with effective hedging and additional trading opportunities. It also provides the shipping industry with an instrument to help reduce price risk in their bunker supply requirements.

Amoco in Poland

Amoco Production Company has signed a cooperative study agreement with Polish Oil and Gas Company, the state-owned oil company of Poland. The agreement is the first involving Poland and an international petroleum exploration company.

Ivanhoe/Rob Roy on stream

A ceremony was held on 10 August at the Occidental Consortium's oil handling terminal at Flotta (Orkney) to celebrate the arrival of the first oil from the Ivanhoe and Rob Roy fields, operated by Amerada Hess Ltd. Oil production from these two fields, located some 90 miles northeast of Aberdeen, began in July.

Amerada Hess has a 42.08 percent in the project. Other participants are Deminex (43.33 percent), Kerr McGee (10.83 percent) and Pict Petroleum (3.75 percent).

The Amerada Hess AH001 floating production facility, in the Ivanhoe/Rob Roy fields.

Instead of using a conventional fixed platform, a semi-submersible vessel was bought and converted at Nigg Bay and Tyneside into a floating production facility, which is now moored centrally between the two fields. According to Dr RW Gaisford, Projects Manager, Amerada were pleased with their decision to convert rather than build or buy. 'It was very cost effective to convert a platform', he said.

Crude is pumped from the production facility 25 miles to Occidental's Claymore 'A' platform and then to the Flotta terminal. Recoverable reserves from the two fields are estimated at 88 million barrels of oil and 69.4 billion cubic feet of gas. The daily average peak production figure is put at 50,000 barrels per day. The fields have a life of 10 years. Mr WSH Laidlaw, Managing Director of Amerada Hess, said at a recent press conference, 'Ivanhoe and Rob Roy show that marginal oilfields can be safely developed in a cost effective manner, using the latest technology.'

Amerada Hess is also the operator on a subsequent discovery, Waverley, made in 1987 only seven miles to the northeast of Ivanhoe and Rob Roy. This Waverley field is considerably larger, with estimated reserve levels of at least 400 million barrels of recoverable oil — one of the largest North Sea discoveries in recent years. It is hoped to start production there in 1993.

Metocean offshore help

A contract to manage the organisation of environmental information for offshore oil activities has been awarded to Metocean Consultancy Ltd, UK, by the North West Approaches Group (NWAG). This is made up of seven oil companies and the Department of Energy.

Metocean is managing the collation and dissemination to NWAG members, of information essential to the planning of exploration drilling and the design of production facilities in specified areas in the North West Approaches to the British Isles from the Hebrides to North of the Shetlands.

Texas Eastern appeal

A Court of Appeal has overturned a High Court ruling that Enterprise Oil is entitled to complete the acquisition of the entire share capital of Texas Eastern North Sea Inc (TENSI) for $961 million. The Court reversed the judgement of Mr Justice Evans in the Commercial Court, and held that TENSI should instead be purchased by Enterprise Oil, British Gas and Amerada Hess. Enterprise expects to petition the House of Lords for leave to appeal the judgement.

Claymore and Scapa

Occidental Petroleum (Caledonia) Limited has resumed oil production from Claymore and Scapa oilfields. Both fields are located on Block 14/19 in the British North Sea, 110 miles northeast of Aberdeen.

The Claymore platform shared the same pipeline system as the Piper Alpha production platform; all operations were shut down following the tragic accident which occurred on Piper in July last year.

BG oil in Ecuador

British Gas announced that its wholly owned subsidiary, BG Ecuador, SA has struck oil following a drilling operation in the southern Oriente Basin jungle area in eastern Ecuador.

The exploration well tested oil with flows at a combined rate of 1,934b/d at an average rate of 18.2 degree API gravity oil on production tests.

Petrofina acquisition

Petrofina (UK) Limited has acquired the whole of the share capital of Lanstar Bitumen Limited for £6.55 million.

The Institute of Petroleum

TRENDS IN WORLD NATURAL GAS TRADE

A One-Day Conference
to be held at
The Institute of Petroleum

25 OCTOBER 1989

Morning Session:

WORLD SUPPLY AND EUROPE

Welcoming Remarks by the Chairman
Mr Charles Allen, Woodside Petroleum Ltd

Keynote Address
Natural Gas — The Longer-Term Perspective
Mr Michael W Clegg

Soviet Gas Potential
Dr Michail B Korchemkin,
The Institute of Economics of the Academy of Sciences in Tallinn, Estonian SSR

UK Outlook Within Europe
Mr James F Allcock
HQ Director of Gas Supplies, British Gas plc

Medium and Longer-Term Trends in Norwegian Development
Dr Helge Ole Bergesen, Nansen Institute, Norway

Discussion and Chairman's Summary

Afternoon Session:

DEMAND AND GROWTH PROSPECTS

Chairman: Mr C Cragg, Financial Times Business Information Energy Group and Editor, International Gas Report

A Japanese Perspective on Far East Gas
Mr Y Santo, General Manager, Osaka Gas Co and a speaker from
Tokyo Electric Power Co.

North America: US-Canada Trade Developments
Mr Michael I German, Senior Vice President, American Gas Association

Competitive Economics of Natural Gas Applications
Mr P A Hunt, Chem Systems International Ltd.

Panel Discussion and Chairman's Summary

For a copy of the registration form, please contact **Caroline Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Telephone 01-636 1004. Telex: 264380. Fax: 01-255 1472.**

Green euphoria . . .
Time someone spoke up for the little people

By AG Bacchus, Retail Manager, Kuwait Petroleum (GB)

The fire-eater on the front cover exemplifies the hype involved in promoting unleaded petrol. 'Fire-eater goes unleaded' read the copyline. 'He was concerned not only for his own health but for the health of the planet'. Emotive stuff but it would seem even fire-eaters cannot completely convince the great British public that it should at once convert to unleaded fuel.

The most recent figures indicate that approximately one quarter of all the petrol that passes through the pumps in Great Britain is now unleaded. It is hardly a statistic to shout from the rooftops, particularly when it is contrasted with a world average of over a half. Of course, Britain was somewhat slow off the mark, unleaded fuel having only been introduced here three years ago and it took a massive price differential incentive to really speed things up.

On the plus side we can at least claim that our conversion rate is now the fastest in Europe. But it had better continue to accelerate, for unleaded fuel is undoubtedly the fuel of the future, and that is no bad thing. The problem, if that is how one can describe it, for the oil industry, is that its introduction in a public relations sense has not been handled all that well — or at least not recently so.

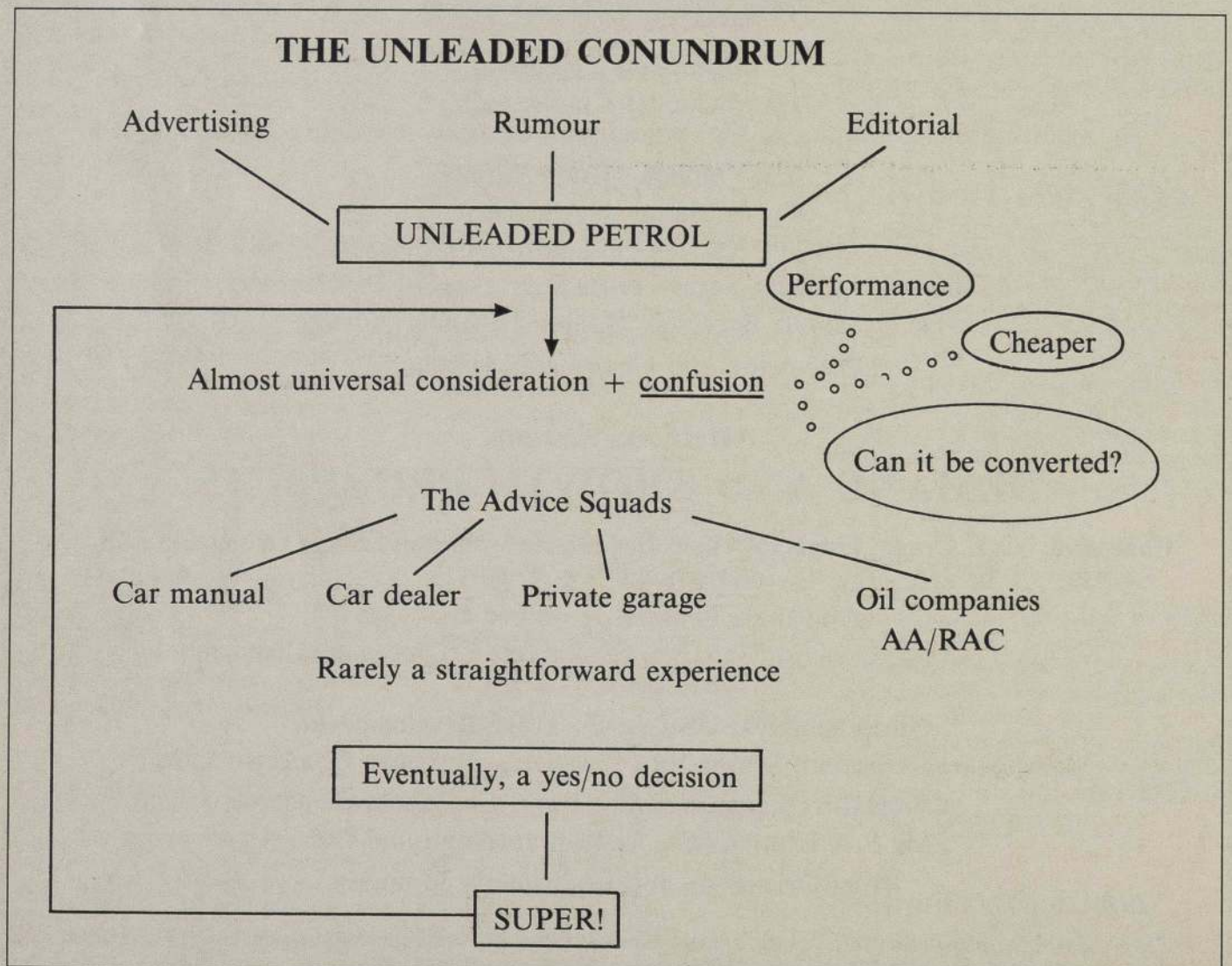


Figure 1 *Source: RBL Research International*

Confusion of Mr Average

My present concerns are essentially twofold and to an extent they are interlinked. Firstly, there is the state of mind of the average petrol consumer, 'the man on the Clapham omnibus', as lawyers call the mythical Mr Average. This person is confused. He appreciates that unleaded petrol is a good thing, but he doesn't really know why. Will it preserve the ozone layer? Will it save the world's rain forests? There is a school of thought which believes that it does not really matter whether the average consumer appreciates that unleaded fuel is only paving the way for the introduction of catalytic converters, or that the current concern with leaded petrol is its unfortunate, but rather tenuous link with brain damage: although far from healthy it is not environmentally dangerous in any fashionable global warming sense. (See **Figure 1.**)

However, just when it looked as if definite progress was being made, with the battle of consumer confusion at last showing signs of success and Clear's Campaign, with its Moses-like declaration that there should be a great 'Day of Adjustment', 'super unleaded' enters (at a price only 2p cheaper than leaded).

Can of worms

Perhaps predictably, some of the industry's big players initially quarrelled. It was suggested that the sudden introduction of 'super-unleaded' would recreate confusion in the minds of motorists with its great emphasis on performance, thus undoing all the good work that had been done convincing the motorist that there was no noticeable difference in performance between leaded and unleaded petrol. It has also been suggested that in any event, very few cars are likely to benefit from 'super-unleaded' at all. In short, 'super-unleaded' faces the charge from some quarters that it has reopened the oil industry's very own can of worms. (See **Figure 2.**)

AG Bacchus

No one can seriously doubt, however, that super-unleaded is here to stay. If ever the phrase 'if you can't beat them, join them' referred to a business, it is the oil business.

So aside from the continuing confusion which can only slow down the conversion rate, and the overt 'over-egging of the green pudding', my other worry is that the smaller sites are being squeezed by the non-conspiratorial actions of government, ill-informed media and the larger oil players.

Policy of Q8

Forgive me if for an instant I blow the Q8 trumpet. Kuwait Petroleum was first to introduce unleaded fuel in five European countries but because of our relatively recent arrival in the United Kingdom we had an awful lot of catching up to do in the race to introduce unleaded petrol. Having put the appropriate systems in place, Q8 'sprang from the blocks' in late-1988. Within a little over six months 75 percent of all our UK retail sites were selling unleaded fuel, well in line with the national average. The majority of our sites are not company owned, typically they are small, independent and dealer-owned. In order to retail a super-unleaded grade, however, many smaller operations would need to invest in the installation of a new tank and all the expense that goes with it. It is quite likely that many such concerns will come to the conclusion that it is not economical to do this. As a result, they will not feel able to compete and so will not compete – the consumer will ultimately suffer.

Blender pumps

A second threat to the small operation is the controversial question of blender pumps and the one-year-only dispensation to sell leaded and unleaded fuel from the same nozzle. Again, this presents no great problem for the big boys but for the smaller independents such a short time scale is seen as yet another potential nail in the proverbial coffin. No doubt the motive behind the DTI date-setting is laudable but I would strongly suggest that the time scale is reconsidered. This is certainly no anti-environmental plea – Q8 has invested heavily in providing the consumer with cleaner fuels, as evidenced by its new 'Clean Blend' diesel introduced earlier this year to rid diesel of its 'dirty' image. However, a reduction in the number of small retail outlets, particularly in more remote rural areas, surely cannot be in the interests of our average consumer — the confused man on the unleaded Clapham omnibus.

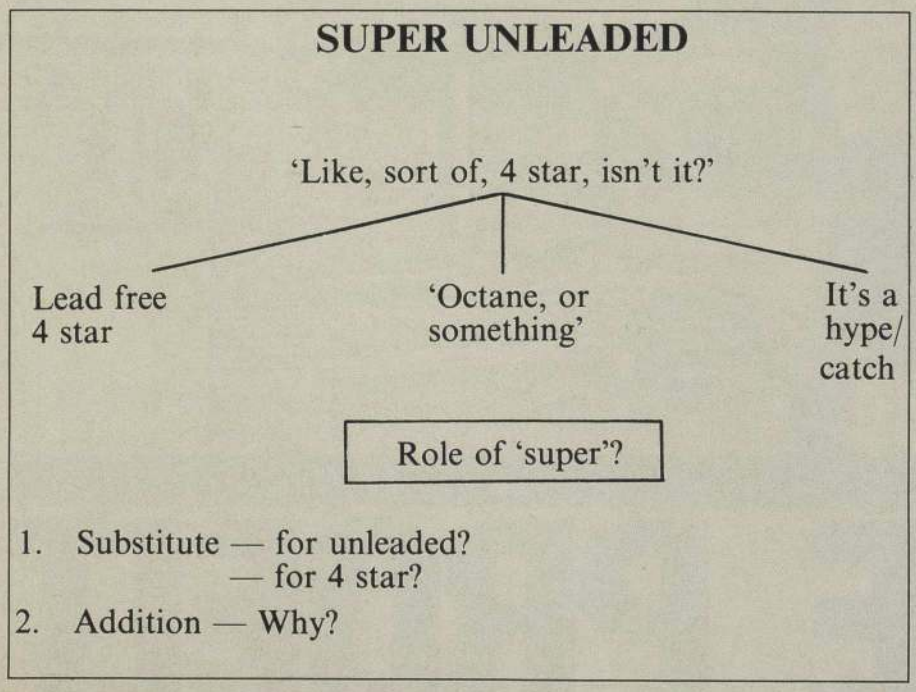


Figure 2 *Source: RBL Research International*

THE BOTTOM LINE BENEFIT OF INSTALLING WHESSTATION

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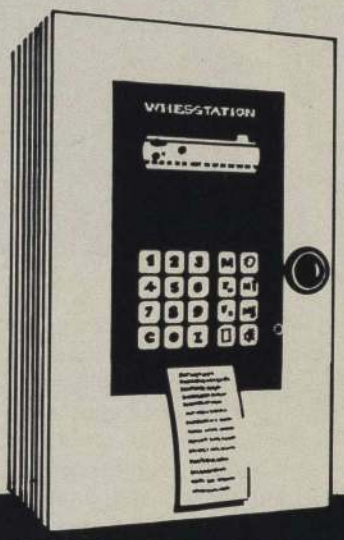

- Eliminates manual dipping and forecourt obstruction.
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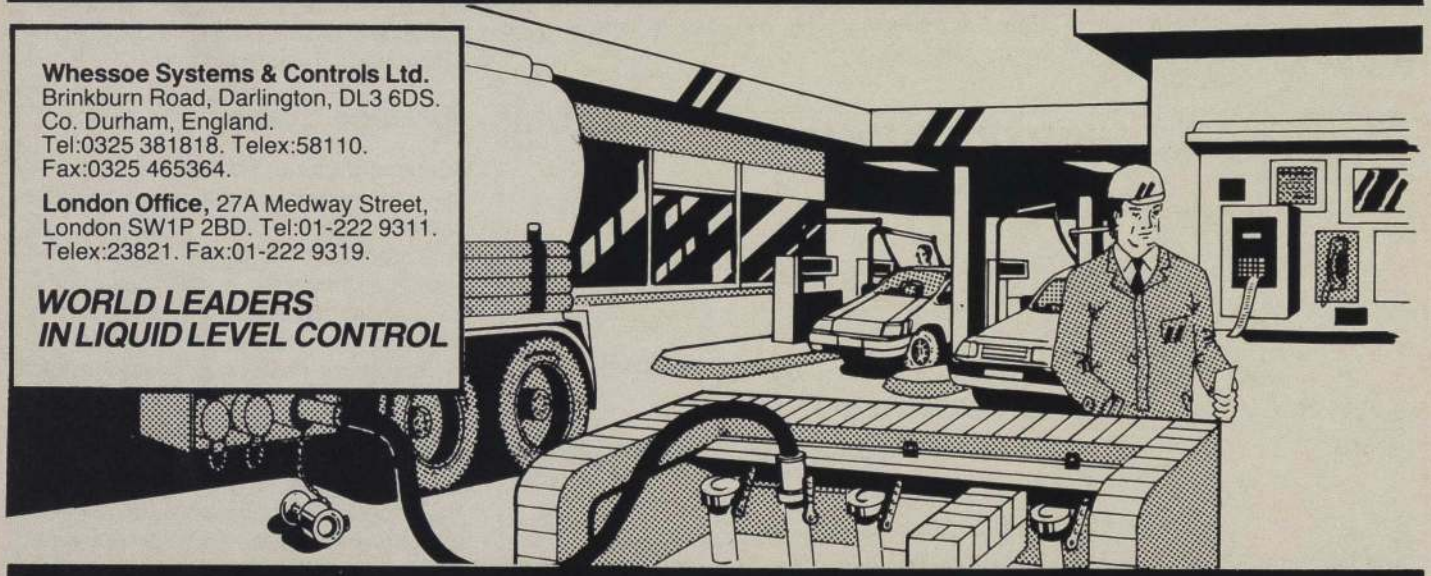
WORLD LEADERS IN LIQUID LEVEL CONTROL



MORE PROFIT

Changes in US unleaded gasoline lead to market uncertainty

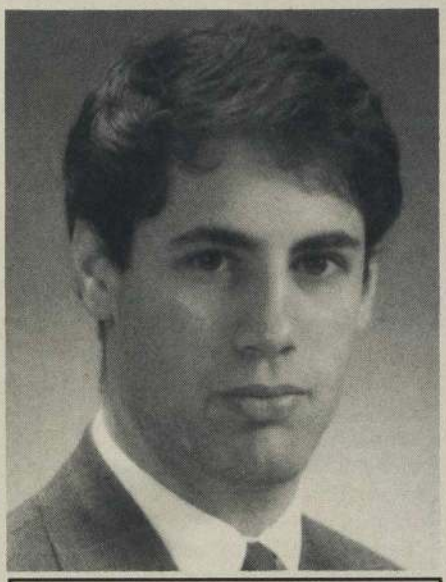
By Daniel Goldman, Staff Consultant, Arthur D. Little

Until recently there has been nothing to suggest that unleaded gasoline demand in the United States would not remain strong and continue to exhibit the same growth as the 2.4 percent average annual increase seen from 1984 to 1988. The continued rise in driver miles, strong outlook for the consumer economy and stable crude oil prices created the expectation that demand for unleaded gasoline would continue to increase.

During the past year, however, gasoline prices have strengthened at both the wholesale and retail level as **Table 1** illustrates. While the rise in crude prices has accounted for some of the increase, four other factors have combined to drive gasoline prices higher and to restrain the potential for continued unleaded gasoline demand growth. Firstly, environmental restrictions have once again become a dominant force in the US market through:

- completion of the lead phase-out;
- reduction of summer volatility;
- control of other gasoline quality characteristics; and
- requirement for retailers to modify service stations.

Secondly, the introduction of an intermediate gasoline grade split in the United States could put more pressure on the already limited octane pool. Thirdly, increases in high octane gasoline sales, combined with high refinery capacity utilization, has necessitated increases in imports. Fourthly, the limited supply of octane barrels in the Atlantic Basin, as European demand increases, will further limit the US octane supply. Each of these factors will be considered in detail in order to explain why gasoline demand growth will be slowed as a result of increased price.



Daniel Goldman is a staff consultant in Arthur D. Little's Energy Economics Group in Cambridge. He is actively involved in economic and financial assessments of the international oil industry, using quantitative modelling techniques.

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Environmental regulation

Lead phase-out. The phase-out date for leaded gasoline is set for 1 January 1991. At that time those vehicles using leaded gasoline will be required to switch over to other fuels (diesel or unleaded). Some of the swtich will be to intermediate grades of unleaded such as the 89 octane grade. Since leaded gasoline demand in 1988 was 491 million bbls (continuing its yearly decline from 634 millions bbls in 1987), at least this volume of additional unleaded gasoline (and minimal amounts of diesel) will have to be produced over the next two years to compensate for the loss of leaded gasoline. It is estimated that by 1991 a 75–90 million bbl increase in demand for 89 octane unleaded will be attributed to the lead phase-out alone.

Volatility reduction. The Environmental Protection Agency (EPA) has lowered the maximum RVP (Reid Vapour Pressure) in gasoline for summer months (May 15–September 15) from 11.5 to 10.5 effective in 1989. A further reduction to 9.0 will be required by 1992. However, many states have enacted or are considering their own legislation effectively nullifying the intermediate EPA reduction of 10.5 and moving directly to the 1992 level of 9.0 RVP (Northeastern/Middle Atlantic states) or 9.5 RVP (Middle America states and California) for 1989 (or 1990 in some states). Most of the Northeastern states have already passed legislation superseding the Federal EPA maximum summer limit (Maine, Vermont, Rhode Island, Massachusetts, New York, Connecticut, New Jersey) while others are considering legislation. Given the pipe-

	1985	*1986*	*1987*	*1988*	*1989 (Est.)*
Wellhead Crude Oil ($/bbl)	24.09	12.51	15.40	12.57	18.00
US Gulf Coast Platt's Spot Cargoes–Lows (cents/gal.)					
—Unl. Regular	76.18	44.69	49.46	47.25	58.30
—Unl. Premium	n.a.	44.69	54.12	54.68	64.75
Retail Sales (cents/gal.)					
—Unl. Regular	120.2	92.70	94.80	94.60	103.0
—Unl. Premium	134.0	108.5	109.3	110.7	115.0

Table 1: Average US crude oil and motor gasoline prices

line infrastructure in the Northeastern/ Middle Atlantic region, it is likely that most gasoline will have to conform to the lowest state RVP level. For example, the Colonial pipeline, which supplies over 30 percent of the Northeast's gasoline, has changed its guidelines to meet the new 9.0 RVP limit, effectively making all those who purchase from it conform to the new regulation. Since the group of Northeastern/Middle-Atlantic states, which comprise the Petroleum Administration for Defense District I (PADD I), consume approximately 37 percent of all unleaded gasoline in the United States, and that one-third of this consumption is premium unleaded, the effect of the new maximum RVP limits is significant and will put added pressure on refiners especially, but not exclusively within PADD I. The consequences of the RVP limit will also impact PADD III (Gulf Coast) refiners, who supply over 30 percent of PADD I gasoline through pipeline connections.

The reduction of the RVP maximum suggests that refining costs will increase since normal butane (n-butane), which has a high octane value (90.5 R+M/2) but also a high RVP (60–64), cannot be used to increase the octane level of unleaded gasoline. Butane is an attractive additive since it is a relatively cheap blendstock and yields high margin motor gasoline with a greater octane value. Estimates put the reduction in gasoline production as a result of limiting butane usage at around 25 million bbls per year for 1989, based on the regulations as they currently stand. This could increase substantially as remaining states move toward the Federal EPA limit of 9.0 RVP in 1992. In addition, the industry estimates that the increase in refining costs attributable to the change in RVP is approximately 3–5 cents per gallon depending on the state RVP limitation and refinery configuration.

To compensate for the loss of octane (eg, the loss of n-butane) one option for refiners is to run catalytic reformers at higher severity, effectively increasing the reformate octane but reducing the gasoline yield. By doing so, refiners produce more n-butane and are therefore essentially penalized twice (eg, lower yield of gasoline and more n-butane). This could create a problem, since refiners will be deficient in butane in the winter but have a surplus in the summer (with a possible RVP spread of 4 between winter and summer). Some storage of butane during the summer is possible but capacity is relatively restricted. N-butane could also be used to produce MTBE which could then contribute as an octane-enhancer. However, high investment costs in isomerization and dehydrogenation of n-butane to iso-butylene make the economics of MTBE tenuous. Another possibility is n-butane isomerization en route to alkylation with FCC derived olefins which may become more attractive as a path to high octane gasoline blending components. The most probable scenario is that some of the excess butane will be used as a petrochemical feedstock. While other options exist for refiners which will be discussed later, the immediate effect of the change in summer RVP will be a lower yield of high octane unleaded gasoline requiring greater refining runs to produce the same amount of gasoline.

Gasoline quality issues. In addition to the volatility reduction, many states are considering the reduction of gasoline benzene content, lowering aromatics and olefin content (California), and requiring the use of oxygenates in gasoline. For example, Colorado has enacted a requirement that gasolines in certain regions should have a 2 wt. % oxygen content during November 1–March 1, while Arizona has required two metropolitan areas to sell gasoline with a 1.9–3.7 wt. % oxygen content during January 1–March 31. The range depends on whether or not ethanol blends capture less than 10 percent of the market. In addition, New Mexico will require 1.8 wt. % oxygenates content in gasoline during October 1–March 31. These other regulations will all contribute to increased refining costs, but also will increase distribution costs since each state may have different regulations as to what can and cannot be included in unleaded gasoline.

Service station regulations. In addition to requiring service stations to have more insurance, recent environmental regulations require retailers to upgrade/ replace underground storage tanks as well as install leak detection devices. The average cost of this upgrading is estimated at $39,000 per service station in 1989. Retailers in a number of states are also required to install vapour control devices to collect the vapour as gasoline is pumped into vehicles and return it to the storage tank. The investment costs for replacement/upgrade and leak detection of underground storage tanks and installation of vapour control devices at the service station will have to be recovered in the price of gasoline.

New gasoline grade split

The trend by motorists toward higher octane fuels (illustrated in **Table 2**) has led to the development of a new retail unleaded grade split at 89 octane (R+M/2). The intermediate octane gasoline is expected to capture at least 10 percent of motor gasoline demand in 1990. Oil companies hope to sustain high margins and reduce pressure on the octane pool by creating the intermediate octane split (by transferring some of premium demand to intermediate). It is unclear whether this is in fact occurring or whether motorists are switching from 87 octane unleaded to the new intermediate split at 89 octane. It is likely that the 87 octane unleaded will gain a larger share of the market during the final period of lead phase-out, after which a move away from 87 octane and toward higher octane fuels will occur. However, the magnitude of the switch to higher octane fuels will depend very much on the overall price increase and the price differential between octane levels. The trend appears to illustrate that the clear octane pool, which was at 88.5 in 1988, is increasing to 88.7 in 1989 and is likely to be 88.8 in 1990.

Refining capacity

The second factor affecting the supply and price of unleaded gasoline is the high capacity utilization at which most refiners are presently operating. US refinery distillation capacity utilization is in the range of 92–95 percent which is close to full operable capacity, especially since many of the operating problems of late 1988/early 1989 have now been corrected. Currently, refiners have increased crude runs and are switching to a lighter crude slate to yield a higher percentage of light products, especially gasoline. Furthermore, refiners are utilizing the inventory build-up of gas oil by cracking it into unleaded gasoline. Finally, new FCC catalysts, which increase gasoline octane levels, are being used. However, this also

	Leaded regular	*Unleaded regular*	*Unleaded intermediate*	*Unleaded premium*
(R+M)/2	89	87	89	92–93
Grade Split: (Percent)				
1985	35.5	49.0	0.0	15.5
1990/91	3.0	62.0	10.0	25.0
1995	0.0	50.0	20.0	30.0

Table 2: US motor gasoline split by octane level

'Imports will still continue their growth, as octane gasoline demand will clearly outstrip refining capacity in 1989 and 1990.'

increases aromatics, olefins and butanes which require additional alkylation or condensation capacity to be absorbed and further utilized. An alternative is to combine the extraction of BTX from light FCC gasoline, which leaves a low volatility/low aromatics/low octane product, with a change in octane promoting catalysts.

Down the road a very limited number of US refineries will be able to expand existing FCC units and deep conversion, particularly coking, will only be adopted if crude distillation is not expanded. The more likely trend will show some expansion of crude distillation units. Alternatively, MTBE capacity additions may look better in Europe than in the United States because of the greater availability of uncommitted isobutylene. Given the limited potential for investment, imports are likely to constitute an increasing percentage of motor gasoline supply. It is estimated that 1989 imports of motor gasoline will reach 158 million bbls, as demand tops 2,700 million bbls. This trend is likely to prompt more spot market imports from Latin American, Western European and Asian refiners.

Atlantic Basin octane supply

While the United States has concentrated on tightening the specifications for unleaded gasoline, Western Europe and Canada have been promoting the phase-down of leaded gasoline. The phase-down will have a significant effect on the US unleaded gasoline market, since an increasing volume of product imports cannot come from Western European refineries unless refining capacity is expanded. As **Table 3** illustrates, imports have been increasing steadily on a percentage basis, with 1988 imports of finished motor gasoline from Western Europe representing 36 percent of total finished motor gasoline imports compared with 22 percent in 1985.

Unlike the United States, Western Europe has significant potential for new conversion capacity and MTBE plants. These are likely to be utilized, given the rising demand for light transport fuel and the rapid phase-in of higher octane Europremium 95 RON unleaded (see *Petroleum Review*, July 1989). The implications of this for the US unleaded gasoline market are threefold. First, as European unleaded gasoline demand increases with the phase-down of leaded gasoline, lower quantities of product will be made available for export to the US market and what is available will command a substantial premium. Furthermore, at certain times shipping costs will drive the price of imports from Europe even higher. Second, as imports increase the product import duty, which is currently at 52 cents/bbl, could be raised by Congress. Third, given the US summer volatility (and other quality) requirements, imports from Western Europe will be somewhat limited or will need to undergo further processing or blending (primarily during the summer months due to RVP requirements). Imports may be increased to a certain extent from other current suppliers, such as Canada, Brazil and Venezuela, provided they can continue to meet RVP requirements. Nonetheless, these factors will still contribute to a substantial increase in the price of unleaded gasoline.

Price implications

The increase in environmental restrictions, tightening of the Atlantic Basin octane pool and the inability to expand conversion refining capacity in the United States will:

- limit the domestic supply of unleaded gasoline,
- require substantial increases in imports,
- lead to higher prices, and consequently
- put downward pressure on demand growth.

Refiners response to making modifications to existing capacity is likely to have some impact on lowering imports. Having brought many units into operation again this summer after maintenance repairs in early 1989, refiners are able to operate at a higher severity effectively maximizing gasoline yield. Overall, however, imports will still continue their growth, as octane gasoline demand will clearly outstrip refining capacity in 1989 and 1990.

US MOTOR GASOLINE DEMAND AND IMPORTS (MMbbls)

	1985	*1986*	*1987*	*1988*	*1989**	*1990**
Motor Gasoline:						
Total	2493	2567	2630	2685	2702	2730
Unleaded	1608	1772	1996	2194	2334	2530
Leaded	885	795	634	491	368	200
Imports	139	119	140	148	158	171
EEC Europe Imports	31	40	44	54	63	72

*Estimates

Table 3: US motor gasoline demand and imports

The evidence suggests a price increase in gasoline over the next two years relative to crude prices. However, the magnitude of the increase is much harder to predict. The price increase will be large if the US consumer economy remains buoyant, further environmental restrictions are imposed and refiners are faced with more operating problems, as they were in 1988. Alternatively, the price increase may be minimal if gasoline demand does not increase as rapidly as expected, imports from other sources besides Western Europe become increasingly available, and the switch to intermediate and premium grades of unleaded gasoline is not as pronounced as expected (eg, reduced pressure on the octane pool). Regardless of the magnitude of the price increase, it appears that the high demand growth seen over the previous four years will not continue into the early 1990s.

Benefits of the new retail distribution software systems

By George E Hudson, Managing Director, Topas (UK) Ltd

In the mid-1970s, petroleum companies and authorised distributors introduced computerised recording systems in place of manual order processing and retail distribution management systems. The 1980s have witnessed the continual refinement of these systems to the present integrated and highly automated retail supply operations. In conjunction with the greater efficiency of these resources, these systems have led to improved customer and employee relations, and enhanced safety. Market analysts envisage the extension of these benefits as automation reaches new aspects of distribution operations.

Logistical problems of scale

Petroleum retailers, whether they are operated by a major oil company or operated by an authorised distributor (AD), have essentially the same distribution requirements.

A supply of the different grades must be maintained at all times, necessitating the delivery of petroleum two, three or more times a week to the retail outlets, usually by standing order arrangements.

With the majors typically operating several thousand sites each, they are faced with a supply problem of considerable scale. Even ADs servicing much smaller networks still have to deal with a very complex array of logistical parameters to maximise delivery efficiency.

To meet these demands retail supply operations have become centralised to streamline the administration of multiple plants serving nationwide networks.

Petroleum supply operations naturally vary from company to company but they tend to share similar basic principles. In brief, once an order is received, or due in the case of a standing order, the central order processing function within a company will note the products required, the size of the order, and offer the customer a time 'window' for delivery. Typically, a company will allocate a reference code for retail sites or other customers such as industrial sites, or even households in the case of home heat deliveries by ADs.

The order is then passed to the order planning department to incorporate the order in the delivery schedule of the day in the most cost effective manner, taking account of truck and driver availability and capabilities.

Once a plan has been drawn up, the planners pass the information on to the despatch personnel, who subsequently send it on to the depots, and the drivers, for loading and despatch to the customer.

Improving distribution efficiency

The continued enhancement of the computer systems controlling the supply of petroleum to retail sites has led to considerable improvements in the efficiency of these distribution operations in many different areas.

Perhaps the greatest improvements have been achieved in the planning department. Computer software is available which will plan the distribution of fleets of more than a 100 tankers in minutes which would otherwise take hours by a much larger team of manual planners. Not only has this achieved considerable savings in terms of manpower, but the systems are also able to cope with a much more complex set of parameters than a manual system, thereby ultimately leading to better plans.

Computer systems are available for single or multi-plant environments, the latter allowing the system to select delivery in terms of either geographic location or product availability at different sites.

The system can allocate orders to drivers and trucks, and takes account of individual compartments within trucks. It also takes account of driver capabilities and truck suitability in terms of access to a particular site. The system can consider factors related to the weather conditions, as this can restrict access to certain regions. An obvious example is ice formation preventing tankers ascending a steep hill.

George Hudson is the managing director at Topas (UK) Ltd, a computer systems house based in Marlow, Bucks. The company, founded 12 years ago, specializes in the development and implementation of petroleum distribution systems

Similarly, the software's database can include details of ferry timetables and other impediments to access so as to minimise the number of wasted journeys. Provisions can also be made for matching drivers to certain geographic areas to encourage familarity with the roads and unloading sites within a region.

By employing such techniques, companies can prevent the lost time, expense and embarrassment of not being able to deliver on time due to poor routing or inaccessability.

Reducing stock levels

With regular stock reconciliations possible at each stage of the distribution process, on a daily or more frequent basis, depot managers are able to keep a close track of stock movements to minimise stock levels and reduce day to day expenditure. Additionally, integrating this information with head office accounting systems allows invoicing to be performed the same day, thereby improving cash flow.

These latest control systems can take account of petrol losses through evaporation at the various stages of the delivery process.

Furthermore, by interfacing with a database of credit worthiness, the software allows poor payers to be weeded out of the system, whilst not slowing the creditworthy, by the use of risk categorisation.

Uprating safety

The increased control offered by integrating all the elements of the distribution process leads to a safer petroleum distribution path. This is especially the case when the company links the order processing and distribution software to an automated fuel dispensing system. The reason for this is that it allows the quantities of fuel to be measured as it is loaded into the tankers, enabling the total weight of the vehicle to be measured to ensure that it stays within legal weight restrictions.

The loading on the individual tanker axles can be measured and the systems can check that the loading on the articulated truck's king-pin is within safe operating limits.

Additionally, such systems can be designed to prevent loading of petrol and heating oil, or other similar incompatible combinations on the truck at compartmental level. This overcomes the potentially disastrous possibility of petrol being used in a domestic heater due to a driver unloading error.

Other safety aspects include monitoring the times worked by tanker drivers to prevent overly-long hours and the ability of the system to identify leakage by accurate stock reconciliations at each stage of the distribution process.

Industrial and customer relations

By maximising the likelihood that a tanker delivery will be successful in terms of meeting scheduled delivery times and access being suitable, drivers are saved the frustration of making repeat journeys.

Drivers also benefit from the ability of modern computer systems to prevent them undertaking unpleasant journeys too often, such as queueing to go through the Dartford Tunnel.

Equally important is the fact that the use of sophisticated software distribution systems can achieve marked improvements in terms of customer relations. By ensuring that administration and distribution costs are kept to a minimum, these systems contribute to keen pricing which benefits the customer. The order processing afforded by this computerisation allows orders to be satisfied more quickly and so provides a competitive edge for the petroleum company.

The improved all-round efficiency afforded by the latest software leads to more deliveries reaching their destinations on time, ultimately resulting in improved customer loyalty and employee relations.

An automated future

Market analysts foresee petroleum companies continuing the trends of the past decade into the 1990s. Companies will further develop their order processing and distribution software systems to achieve a more centralised and integrated system with extensive automation.

The technology to further enhance existing systems by extending the degree of automation from the initial order-taking to automated loading prior to delivery is largely developed. Essentially, the factors limiting further automation include legal restrictions regarding manning requirements for petroleum distribution and the pilot scheme evaluations necessary to ensure proper operation.

Ultimately, we envisage distribution systems improving further to offer greater cost savings for the petroleum companies and improved service for retail outlets and end users.

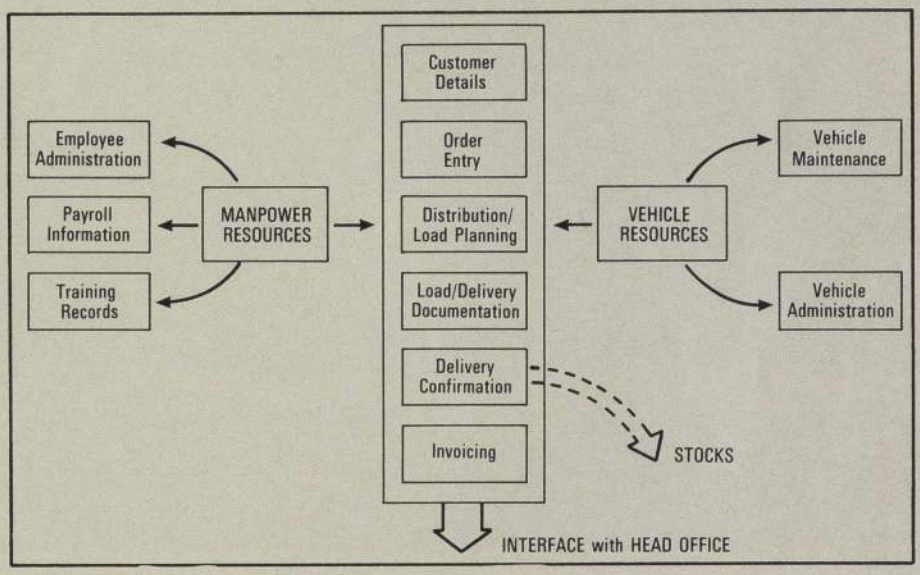

Figure 1: The relationship between the core modules (centre of diagram) of TOPAS software for handling orders and distribution. Additional modules optimise the use of manpower and vehicle resources, and other factors such as stocks and interfaces with head office.

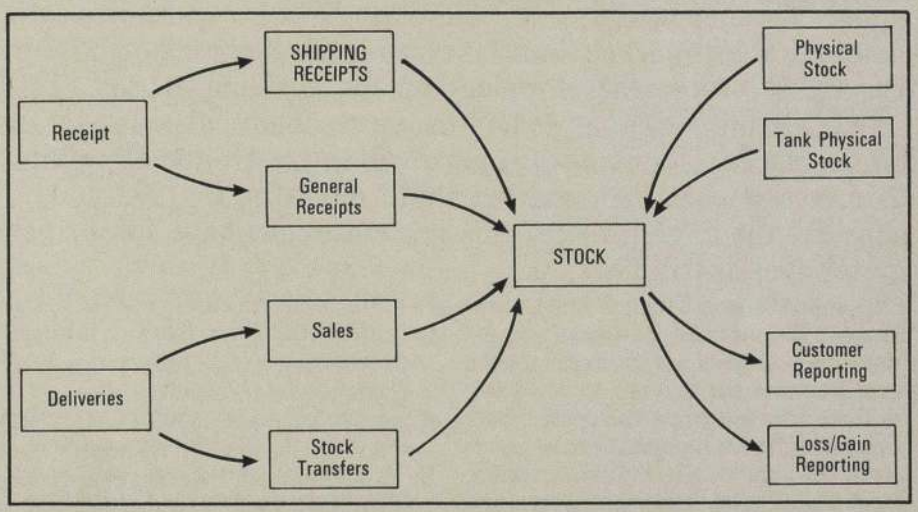

Figure 2: The relationship between the core stock control modules of TOPAS software.

Superstores penetrate motor fuel retailing

By Mathieu Zajdela, Head of Studies, Enerfinance

Superstores* occupy a varying position in European motor fuel retailing, from a low 6 percent in the United Kingdom, through 9.5 percent in West Germany and 12.5 percent in Switzerland to a high 37 percent in France. Although British superstores now hold a modest market share, they have the highest potential in Europe for future development on the gasoline market. This article attempts to analyse factors which could either favour or hinder the development of superstores in the United Kingdom, to forecast what their market share might be in 1993 and to consider the consequences this growth might have for British motor fuel distributors.

That superstores sell motor fuels is an accepted fact in most European countries. This category of distributor holds an average market share of 10.5 percent in Europe** although there are wide variations between countries — very strong penetration in France, medium penetration in Belgium, West Germany, Switzerland and the United Kingdom, and little or no penetration in Denmark, Italy, the Netherlands, Norway, Portugal and Spain.

Several factors account for this:

- the number of superstores operating and their potential for development,
- the presence of various institutional constraints affecting the distribution of petroleum products,
- superstores' strategies on the motor fuels market,
- logistics (pipelines, storage, etc) and superstores' supply structure,
- the competitiveness of traditional distribution networks compared with superstores,
- the availability and cost of land (particularly for supermarket car-parks),
- organisation of the local motor fuels market (such as the presence of a major company organising the competition).

Increase likely in UK

For a given country, the number of superstores is determined by the level of salaries, the number of vehicles registered and the general position for development (such as legal obstacles to superstore development). The UK standard of living suggests that the country is still under-equipped (eight superstores per million inhabitants, against 11 in France and 15

in West Germany), a backlog explained by a whole bunch of institutional constraints. Theoretically, there is a strong potential for new installations. On the hypothesis that there could be 600–800 units in the next five to seven years, superstores can be expected to increase their market share for motor fuels to the extent that approximately 40 percent of new superstore sites will include a service station.

Dynamic prices

The second essential factor is superstores' strategies for the motor fuels market. British superstores do not use motor fuels as loss-leaders and it seems unlikely that any British group will do so in the foreseeable future. This attitude marks them out from their French opposite numbers and can be explained in several ways.

Firstly, it goes against the grain for a British superstore to lose money on a product, particularly one with as high a profitability profile as motor fuel.

Secondly, contrary to the position in France, the British motor fuel distributors' financial structure does not lend itself to a strategy of loss-leader products.

Thirdly, British superstores apply a policy which is at least as much based on quality (of services and of products) as it is on pricing, particularly in the superstores' service stations where most of them offer a 'quality' image, with attractive forecourts, charge cards and branded goods. A strategy of maximum price discounts would necessarily mean degrading the image of motor fuel sales and this could in turn have a serious knock-on-effect on the superstore as a whole.

On the other hand, it should be noted that British superstore management in general is determined to increase its throughput sharply.

All these factors mean that UK superstores practise a policy of strong discounts with a positive margin. Their refusal to adopt loss-leader prices represents an essential element since, faced with operators selling at a loss, the traditional companies would be almost defenceless. From this point of view, the United Kingdom occupies a middle position: strong discounting by the superstores favours their development on the motor fuels market but the British groups' refusal to apply loss-leader policies for motor fuels reduces the dangers of a runaway success.

Majors control supplies

The supply situation is an important factor, and here, the United Kingdom is characterised by the tight control the majors exercise over supplies.

Filling up at a Tesco superstore.

For obvious geographical reasons and also because pipelines and storage are very largely in the hands of the majors, it is virtually impossible for hypermarket chains to have their own motor fuels supply structure. Furthermore, none of these chains even appears to want to undertake such a strategy.

This explains why most superstores are supplied directly by the majors via supply agreements. For the present, the majors have managed to impose much more favourable terms in the UK than on superstores in other European countries, although competition is going to reduce progressively suppliers' margins, to the benefit of the superstores.

The supply position therefore permits one to suppose that superstores' motor fuel sales are going to remain under the control of the majors and on the other hand, that superstores in the United Kingdom are always going to have less room to manoeuvre than their Continental opposite numbers when it comes to discounting pump prices.

Big competitive gap

The efficiency — or lack of it — is a relatively important factor in explaining the development of the superstores. Their service stations' average throughput is some 7,500 cubic metres (1.6 million gallons) a year, more than five times higher than the national average (and three times more than the majors' networks). This difference also leads to significant differentials in distribution costs.

In the UK, the costs differential between the traditional and superstore networks is on average about $39 per cubic metre.

Generally speaking, it can be considered that the traditional network would have to achieve an average annual throughput of 2,200 cubic metres (which would allow the majors' networks to reach about 3,000–3,500 cubic metres) to be in a position to reduce the average cost differential to, say, $14–16 a cubic metre.

This cost differential, which must be seen as a differential of equivalent prices, can be accepted by the consumer if a higher 'quality' is provided by the traditional network (products quality, closeness, means of payment, etc). Thus, this would imply that the number of POS would have to be cut by at least 2,500 between now and end-1992 (on the assumption of 2.5–3.0 percent annual growth of network sales). In view of the fairly high margins in the United Kingdom, the present restructuring of networks is insufficient to hit these targets.

Since high margins increase service station prices and hence traditional oper-

ators' distribution costs, there emerges a curious paradox — high British margins favour the development of superstores on the motor fuels market, yet this very development in the long run induces lower margins.

The various factors involved (of which only the principal ones have been analysed here) can have a different or indeed an opposite effect on superstore development on the motor fuels market, as summarised in the table (right).

Growth forecast

Overall, the United Kingdom can be expected to see a sharp growth of superstores on the motor fuels market between now and 1992. At that date, nearly 400 superstore service stations might hold 8–9 percent of the motor fuels market. However, the possibility of superstores having a share of 12–13 percent in 1993 appears to be extremely limited. The superstore phenomenon is growing but remains under the tight control of the majors.

Distribution margins

The growth of the superstores' market share is likely to mean an inevitable erosion of distribution margins in the United Kingdom, an increase in regional disparities of margins and a more rapid decline of the number of POS.

It cannot in fact be excluded that the majors may have to resort to local price wars to allow the market to find its equilibrium and incite the superstores to hike their pump prices. The UK market would then achieve a balanced situation in the mid-1990s, with the superstores holding no more than 9–10 percent of the market and setting their pump prices some $15–25 per cubic metre below those of the majors.

Factors influencing hyper/supermarket development on the motor fuel market in the UK

	Comments	Impact
Expected growth in number of hyper/supermarkets	Very high theoretical potential.	+
Oil sector legal framework	Liberal. A few constraints remain on building new sites.	+
Efficiency of traditional networks	Very high gap between competitiveness and costs.	+
Control of the majors over hyper/supermarkets networks	Tight control over superstores' service stations.	–
Competition on the supply side	Relatively weak. Logistics well controlled by the majors.	– –
Cost/availability of land	Middle position for UK (higher scarcity than in France).	–
Hyper/supermarket gasoline price strategy	Dynamic strategy but no loss-leader prices.	+ +

\+ Positive but limited factor
\+ + Major factor
– Minor brake
– – Over-riding brake

*Superstores: more than 2,500 sq m (or 25,000 sq ft) of selling area.

**Ten countries: Belgium, France, Italy, West Germany, Netherlands, Portugal, Spain, Sweden, Switzerland, UK.

This article is based on the study 'Hyper/supermarkets in the European Retailing of Motor Fuels', published by Enerfinance in April 1989.

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A two grade pattern for unleaded petrol

A second grade of unleaded petrol, a 98 octane super plus, has been made available by three major brands: BP, Esso and Mobil. Jonathan Wake, Product Manager, Retail Motor Fuels, BP Oil, UK which launched first with its BP SuperGreen, discusses the implications of this marketing development in an interview with *Petroleum Review*.

Jonathan Wake gives the reasons for the introduction of BP Unleaded SuperGreen:

- The target market is the high performance car engine which cannot run on ordinary 95 octane unleaded petrol without significant loss of performance whereas Esso seem to be targeting all those who would have to retard their ignition for ordinary unleaded.
- A super unleaded petrol as a second grade is here to stay — but as the niche grade, with 95 octane unleaded petrol supplying the bulk of the volume.
- The introduction of super unleaded petrol will help to clarify and simplify the marketing and spread of unleaded petrol for the motorist.

Geoffrey Mayhew: Why has a 98 octane super unleaded petrol been made available in the UK — in your case, BP SuperGreen?

Jonathan Wake: We introduced BP SuperGreen to meet a market demand. There are some sections of the car population that are compatible for unleaded petrol but cannot use standard unleaded, 95 octane Eurograde, without losing performance or economy. There may very well be something like one million cars in that market, a 5 percent niche.

If we had not launched BP SuperGreen, they probably would not have used unleaded at all. Our feedback was that they would like to go unleaded, if they could. We saw a marketing opportunity there.

They were using leaded 4-star?

They were, and they could not retune for 95 octane unleaded petrol without incurring a penalty. Their cars were compatible for unleaded petrol but they were stuck.

What are these one million cars?

The most obvious ones are Jaguars, which have a high octane requirement. They have been produced for a world market, in particular for an American market, which has been unleaded for quite some time, so they do not have a problem with valve seats. They are compatible for unleaded, but they have a high octane requirement.

This is the modern Jaguar?

Yes, as well as a lot of older Jaguars. Certainly over the last 10 or 15 years you will probably find most Jaguars are compatible for unleaded petrol but they have a high octane requirement.

That is not the only high performance car?

No, Volvos are another category but Volvos are slightly different. There are some Volvos which need high octane; there are others which can be retuned for ordinary unleaded but that is a fairly major operation which involves taking off the cylinder head and adjusting the compression ratios, etc. and it costs almost £100 to do.

Our view is that many motorists would rather not do that if they could use a high octane unleaded petrol; they would rather just run with that.

Volvo have recently put out a leaflet promoting high octane unleaded as being suitable for a good number of their cars.

Then another category tends to be the

Jonathan Wake

high performance turbo-type models. There are a number of manufacturers who have a turbo model in their range which does have hardened valve seats but which has a high octane requirement.

Do all petrol suppliers provide this second grade of unleaded petrol?

No. Until we launched BP SuperGreen in March there was not such a petrol in the UK. Everyone was providing standard 95 octane unleaded. Esso followed at the beginning of July, some three or four months after we launched our SuperGreen. Mobil also have launched a super unleaded petrol.

We have seen in the press that others are going to introduce it, but we have not seen any evidence to date out in the field that they have. (Shell told *Petroleum Review* that they had introduced a super unleaded petrol at two sites during August.)

How many of your outlets have a SuperGreen pump?

About 500 out of a total of about 1,950 outlets — one in four.

Is that throughout the country?

Yes. Our network *per se* is not spread evenly across the country, so there will be some regional bias, but pretty well all over the country there is a site within reach.

Do your competitors have nationwide coverage?

Esso have announced they have it at something like 1,000 sites. They launched in July pretty well on day one with a national network, whereas we launched back in March just in the southeast and rolled out gradually across the country.

You were testing reaction?

No. We just chose to launch in one area and then to roll it out from there.

Is it awkward to devote one pump at an outlet to this super unleaded for only a million cars?

Not really. Although there are only a million cars and they, if you like, account for about 5 percent of the car population, we figured that we would achieve more than a 5 percent penetration. Firstly, these cars tend to travel more than other cars and therefore account for more than 5 percent of the petrol sold. Secondly, by launching first we hoped to steal a march on our competitors. Maybe some of them would not follow. So we were looking at something like 10 to 15 percent sales on our network and, indeed, SuperGreen currently accounts for around 10 percent in sales on the sites that we sample to see what the sales are like.

That is good?

Yes, that is good and that justifies the pump. Indeed the old 2-star petrol, for instance, had settled, prior to the introduction of unleaded petrol at around 6 or 8 percent of the market. Ten percent through one pump is not unreasonable.

Is super unleaded petrol unique to the UK?

No, it is not. West Germany launched it at the beginning of this year as an industry-agreed product. No one company launched first. A number of companies launched it together.

We have since followed in the UK. Shell have introduced it in Holland. Esso have introduced it in Belgium and a number of companies have introduced it in France.

Is it available elsewhere in the world — in America?

Yes. They have had unleaded for a long time, and they have three octane grades.

How is it selling in the rest of Europe?

In Belgium and Holland it is too early to tell because they launched in the last month or so. Similarly in France. In West Germany, I understand the levels are similar to what we are experiencing — round about 10 percent.

Will it become a much larger market than 10 percent in this country?

I would think that it would be in the range 10 to 15 percent.

Most cars that don't need lead are suitable for the 95 octane unleaded and most cars that are coming off the production lines are designed for that. This 95 octane has been the industry-agreed grade of unleaded that would be provided across Europe and most car manufacturers are producing cars for that grade. It is not expected to change.

I expect there will, though, continue to be a niche for cars that do have a high octane requirement.

But I am not expecting that car manufacturers will now rethink their future car plans. They will continue the way they are with most of their cars being 95 octane compatible, but with maybe one or two performance models requiring a higher octane.

Does your figure of 10 percent sales of super unleaded apply to the other brands?

We have not done any testing, any market research, as to the level of sales they are achieving.

Esso are promoting their super unleaded slightly differently from ourselves. I get the impression from Esso's leaflets and the television campaign they are running that they are promoting it as a grade of unleaded suitable not only for the high performance cars but also for those motorists who would otherwise need to retard their ignition. If you include those cars, the target population increases quite significantly.

Do you go along with that Esso view?

At the end of the day I think it is the motorists' choice. We have promoted BP SuperGreen as a niche product, a high octane unleaded required only by a certain number of cars.

We point out to motorists in our leaflets and our publicity material that most should not notice any significant performance loss in retarding their ignitions for standard unleaded. Therefore, they will be better off to do that — retard the ignition — and enjoy the price advantage of ordinary unleaded petrol. Some motorists though may perceive it as a hassle to retard their ignition and therefore prefer to switch to SuperGreen.

Esso say that of the 70 percent who have not converted to unleaded petrol, a very large number have engines which can run on 95 octane unleaded with an adjustment but which could quite easily, without any adjustment, run on the super unleaded.

That is true. It is the same with BP SuperGreen. Any car that is compatible with unleaded petrol could use BP SuperGreen without any adjustment.

And save a little money as well?

Yes. Motorists may save a little on the conversion cost — they would not have to pay for retarding their ignition. But then they forgo the opportunity of a saving on their petrol bill because although SuperGreen is priced below leaded 4 star petrol, it costs more than standard unleaded. The other equation they therefore have to think about is whether it would not be worthwhile to pay for the cost of retarding the ignition and enjoy the full 12p per gallon price difference on ordinary unleaded petrol. The cost of retarding the ignition on most cars is not great. Vauxhall dealers do it free, for instance. Most conversions would cost up to, say, £10, £10 to £15. Most would quickly recover that at 12p a gallon difference.

Where are the SuperGreen customers coming from?

They are coming from users of standard unleaded but mostly from users of 4-star leaded.

There will be some who will be saying: 'Okay, I will not bother to retard my ignition. I will just convert straightaway to SuperGreen.'

There will be others who will be saying: "Well, I have always felt I have never run

Three Companies' Super Unleaded

	BP	Esso	Mobil
Name	BP SuperGreen	Esso Super Plus Unleaded	Mobil Super Plus
Specification	98 RON min 88 MON min	98 RON	Equal to 4 star leaded with additional additive package containing detergent and oxidation inhibitors
Date introduced	March 1989	3 July 1989	14 July 1989
No of outlets within 2 years	1,000 out of 2,000	1,000 now out of nearly 3,000	Almost all Mobil sites, some 900.
Performance	4 star performance without lead	Offers a choice of high quality and not converting or of converting. Of the 70 percent who have not converted, a substantial number have engines designed for unleaded petrol. They are using 4 star leaded petrol. By converting their engines, they could take 95 octane unleaded. But they could take 98 Super Plus Unleaded now, without a conversion and save money.	The same power and performance with an environmentally friendly fuel that used to be obtained from 4 star leaded.
Market	Higher performance cars that require higher octane unleaded petrol		High performance cars which cannot function adequately on 95 octane unleaded petrol and cars which can be converted to run on unleaded but have not done so.

properly with 95 octane. It has never run as well as it used to. I will give this 98 octane a go."

There will be others again who will say: "I have a really super car. therefore I need a super petrol," and, they may use the higher octane irrespective of whether they actually do need it or not.

They like to think they might need it.

However, our figures show that of the 10 percent of customers who are using SuperGreen, only 25 to 30 percent of them possibly have traded up from ordinary unleaded. A good 70 percent are incremental unleaded customers who probably would not have been using unleaded at all had it not been for the SuperGreen being on sale there.

Does this mean that in the future there will be a pattern of two grades of unleaded petrol, as there used to be with the leaded petrol?

Yes, that is the way we see it — except that it is the other way round. With the two grades of leaded, the 4-star was the main grade and the 2-star was the minor grade, if you like. We would see that eventually 4-star would become the minor leaded, Eurograde would become the standard grade unleaded and then SuperGreen or super unleaded, or whatever one wishes to call it, would be a premium niche grade.

As a marketer, do you think that is a good pattern?

Yes indeed. We market a standard grade of unleaded as our main grade suitable for most cars but there are some high performance cars, some top-of-the-range cars, which need a higher octane, so meeting the needs of that market segment is a good marketing response.

One company is saying, 'Don't do it.' Why?

I am not sure exactly what their motives are but I gather from the press that they are saying that it has not been helpful to the motoring public to launch a second grade while everyone is still trying to get to grips with what unleaded is all about.

BP launched SuperGreen in March, three years after the launch of 95 octane unleaded. Information on the two grades was provided in a commercial which ran for five weeks on television and this message is developed in a leaflet available from all BP service stations. West Germany and America have three grades of unleaded and I am sure we can cope with two.

Indeed, by launching two grades, I think the unleaded message is easier to put across.

Cars now fall into three camps: 1, those that cannot use any unleaded petrol because they have not got hardened valve seats; or, 2, those that have hardened valve seats and can use either standard unleaded if they are in the major category or, 3, those that have that high octane requirement and need SuperGreen.

More choice?

Yes. There used to be two camps: either you could or you could not but in the 'could not' there were some who could if they had the right grade and others who could not under any circumstances. It was somewhat confusing. The BP leaflet, available at our sites, spells out the situation clearly.

There are now two grades of unleaded which satisfy the different octane requirements of the cars. The leaflet also talks about the question of what an engine needs to be a user of unleaded petrol.

You are not the only brand to distribute information?

No we are not. Our leaflet spells out the situation clearly — what an engine needs to be compatible for unleaded petrol. It talks about a car's octane requirements and then shows that we have two grades to meet those.

There are lists of cars which can and cannot change?

The standard list that most people use is called the RULE list; meaning E, you can use either; L, you have to use leaded only; U, you must use only unleaded because you have a catalytic converter on your car; and R, refer to your dealer.

Usually R means you need to retard your ignition somewhat.

The problem — and this refers back to the point about the L category which is for leaded only — is that up until now that category has covered not only those cars that do not have hardened valve seats but also those cars that may have hardened valve seats but need a higher octane than ordinary unleaded.

The L category of cars now has to be broken down into those which are truly L cars — they have not got hardened valve seats — and those which are now capable of using unleaded petrol because we have a high octane unleaded grade that meets their requirements.

We have spoken to car manufacturers to see which of their cars are suitable and we are currently compiling a list by manufacturer of which cars are suitable and those which are not. It will be ratified by all the manufacturers. We have had their responses and we are collating those into publishable form. We will then distribute them amongst motor manufacturers again to get their approval.

What lessons have you learned from the people who switched to unleaded? Do they understand or not?

I think most of them do understand. I think that most motorists are protective of their cars. After all, it is probably the second most expensive thing they ever buy apart from their house. In our experience they need quite a lot of reassurance before they change.

Is it one in five who have done it?

Yes, even one in four; 20 to 25 percent of sales are now unleaded. I believe that most of those one in five did some research before they switched to find out from their dealers or owner's handbook or wherever whether their car was compatible before they made the switch.

In marketing terms have you introduced super unleaded at the right moment or at a premature moment?

No, not premature at all. Sales of standard unleaded really took off after the Budget when the price advantage over 4-star leaded was increased. We decided that would be an appropriate time to offer the motorist a choice of unleaded grades.

The key was the lower price?

There were two keys really. The key to unleaded taking off, was partly the lower price but also partly — and just as importantly — the increase in availability.

By withdrawing 2-star and 3-star we were able to offer unleaded across our whole network and from more than one pump on those sites.

That has helped more motorists to convert, because one of the things that was holding them back was the doubt whether they would always be able to get it.

That doubt has now gone. They know they can get unleaded at every site and they know that on most of those sites there is not just one pump. They are not going to have to queue for it. That as much as price has prompted the upsurge in demand.

Coupled with that, of course, has been the tremendous amount of publicity after the Budget, and I guess it was the price differential that prompted that publicity.

As everyone scrambled to find out whether their car was compatible for unleaded or not, that seemed to us to be the right time to be saying we have two grades.

A third aspect was that in forecasting the increase in demand for unleaded, we expected there would be an increase in demand amongst fleet operators. Whilst most of a fleet would be users of ordinary unleaded petrol, we judged that the top end, the executive cars within the company, would be in the Jaguar type of market and possibly could not go unleaded unless there was a SuperGreen. We thought it was timely to produce a super unleaded which would help those fleets that were wishing to go totally unleaded but perhaps were not able to because all their cars were not compatible, their executive ones in particular.

What is your reaction to the fact that Esso and Mobil have also introduced super unleaded?

We are not at all surprised. We expected that eventually our competitors would follow. We did not envisage that we would be allowed to capture that market segment all for ourselves and we expected them to follow in due course.

We are a little bit surprised, perhaps, that Esso seem to be promoting it beyond just the market segment we have targeted ourselves. But that is what competition is all about, and what motoring is all about.

Are you expecting the market for super unleaded to rise to 15 percent, say?

We thought it would settle at around 10 percent but expect it could be anywhere up to 15 percent, depending upon how big a share of that niche we were hoping to obtain — I would not envisage it rising above 15 percent.

Can a super unleaded petrol be produced at any modern refinery?

I would think so. It should be said though that whilst most refineries can produce it, pretty well every refinery would have a production constraint on them. They could not produce unlimited quantities of it.

Does the Rotterdam refining market affect this situation at all — through the importation of petrol from Rotterdam, for example?

No, not directly. We provide our SuperGreen within the UK totally from our BP refinery at Grangemouth. The BP Rotterdam refinery also produces a SuperGreen equivalent for some of our European associates.

Dynamics of Petroleum Price Formation

Ramon Espinasa, Head, International Oil Analysis, Maraven, Petroleos de Venezuela, gave the following address at the 11th international conference of the IAEE recently in Caracas

The long term dynamics of the world petroleum market showed a remarkable stability between the early 1930s and the late 1950s, under the control of the petroleum capital of the consuming countries. During this period, the rent demanded by the oil exporting countries as owners of the resources, played no role in petroleum price formation. The progressive exercise of their property rights over the resources by the oil countries weakened the control of transnational capital over the world oil market throughout the 1960s. Finally, the OPEC countries imposed their property rights and took over the control of production in their territories. Thus emerged the present, highly unstable situation, in which two centres of power coexist. But a scenario of stable agreement betwen the two parties can be envisaged.

The early industry

The conditions of production and the price of crude oil in the United States shaped the international petroleum industry. Until the early 1950s, it was producing more crude oil than the rest of the world taken together and until the Second World War, it was a net exporter of crude oil and petroleum products. In the first quarter of this century, US crude oil exports delivered at the Gulf of Mexico, constituted the bulk of world supply. Thus, the US domestic price became the natural basis for the international petroleum price.

A series of agreements between 1928 and 1934 among the leading world producing corporations, laid the foundations for their working together as an oligopoly — the International Petroleum Cartel (IPC) — which closely controlled world production and marketing until the late 1950s. The basis on which the corporations were to secure oligopolist pricing outside the US was four-fold: the joint regulation of production; the assignment of quotas and areas for the marketing of petroleum products; the quotations of the fob price of US crude exports at the ports in the Gulf of Mexico as the basing point price for worldwide deliveries ('Gulf-plus' pricing system); and the exclusion of corporations outside the oligopoly from the main production areas, this being achieved by retaining much larger concession areas than were actually being developed.

Control and stability of the US oil market, once its domestic price became the cornerstone of worldwide pricing was achieved, from 1935, by federal regulatory commissions. These were to work together with state commissions, assigning quotas to oil producing states. Thus, the monopolistic power of the large corporations controlling the transportation and refinery network in the US, which had moved upstream abroad, was enhanced by the constitution of State and Federal regulatory commissions in which they had a decisive representation. What then emerged was a highly efficient system for the control of both US and international petroleum production and pricing. This is witnessed by the evolution of US well-head price and the Venezuelan fob price in real terms for the period 1917–1958 as shown in **Figure 1.**

'Gulf-plus' pricing secured monopoly profits for the oligopoly of transnational corporations constituting the IPC. Monopoly profits were gained in two ways. First and foremost, they were in the form of a differential rent calculated as the difference between the cost of production in the marginal wells operating at the US domestic price and the lower cost of production elsewhere. In addition to the differential rent, the IPC obtained profits due to relative transportation costs.

As the Middle East gained relative importance as a source of world oil supply after the Second World War, the IPC created a second basing point in the Persian Gulf. This had the effect of reducing the cif price for all destinations East of Suez and West as far as Italy, and reduced *pro tanto* the transport cost differential appropriated by the IPC for its deliveries from the Persian Gulf. Italy was the equalization point that secured a similar 'net-back' fob price in both the Persian and Mexican Gulfs. Middle East crude gained competitiveness as the equalization point moved westward, which meant ever lower fob prices in the Persian Gulf. The equalization point reached the US East Coast in 1949.

The fear of an overflow of crude from the Persian Gulf area triggered the adoption of oil import regulations in the US throughout the 1950s. These first took the form of voluntary restraints which became compulsory under federal control in 1959, which meant the isolation of the US market from the rest of the world.

Lease agreements

In the US, lease agreements for oil bearing grounds specify a royalty payment as ground rent. This royalty is commonly

Figure 1. US well-head—Venezuela fob 1917–1972 (constant 1967 $)

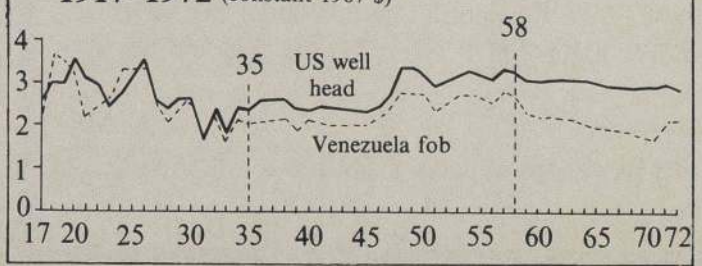


Figure 2. Venezuela average price formation per barrel ($ a barrel)

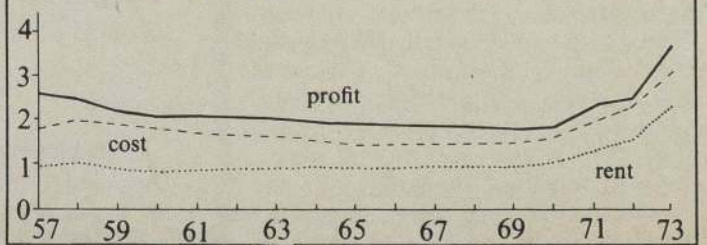


Figure 3. World petroleum consumption (mbd)

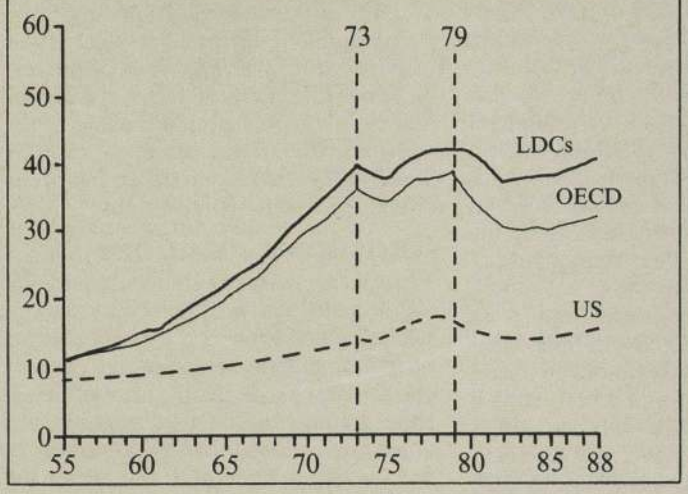
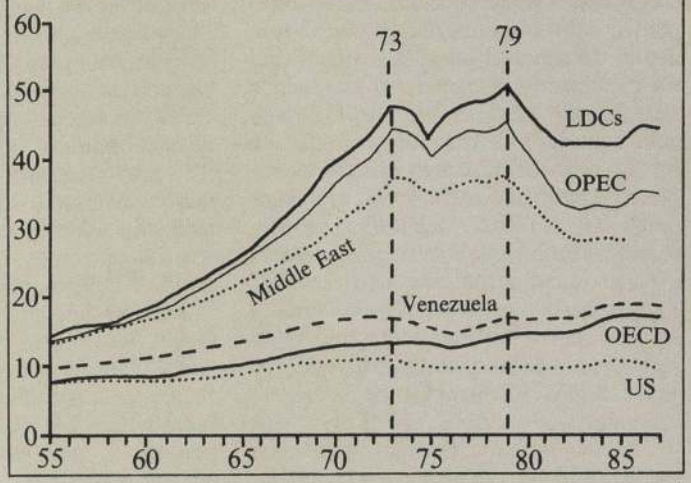


Figure 4. World petroleum production (mbd)



accepted to be between 1/8th and 1/6th of the well-head price. These royalty levels, established during the last century have shown a remarkable stability even on public lands. Moreover, the US has taken a stance in favour of the producing companies through fiscal privileges, such as the depletion allowance and adopting a neutral role with regards to ground rent.

The lease agreements in the US constituted the natural point of reference for contracts between the oil nations, as owners of the resources, and transnational petroleum capital, whereby a royalty would also be paid. Additionally, transnational petroleum capital had to pay taxes for its economic activities to the host countries. Here also, the fiscal pattern in the oil sector of the US was first followed by the oil countries.

There was, however, a key difference in the role of the state in the oil countries as compared to the US. In the oil countries, the state would seek to increase oil rent as a means of financing capital accumulation in the non-oil sector. Therefore, in the oil countries there existed a historical struggle between the state and transnational petroleum capital for the distribution of the surplus as rent or profits, which did not exist in the home countries of the petrolum capital.

The development of the rent in the oil countries was a long historical process, which in many countries necessitated their constitution as sovereign nation-states as a first step towards the exercise of full property rights over the resources. Transnational petroleum capital would resist as much and as long as possible such demands, since they meant a reduction of their extraordinary profits. Royalty and tax conditions similar to those in the US were not reached in Venezuela until the mid 1940s, and for the Middle East as a whole not until the 1950s. Up to that moment, transnational petroleum capital benefited from a lower rent in the oil countries, on top of the differential rent.

Constant rent and falling prices

The political and institutional development of the oil countries made it possible for them to demand from the large petroleum corporations the relinquishment of idle production areas. These areas were then largely awarded to independent corporations which offered higher rents. This was the case with new concessions awarded in the traditional oil countries throughout the 1950s. Furthermore, the incorporation of the North African countries in the early 1960s opened up new production areas where the independents had a leading role. Thus the competition among the potential lessees pushed up the rent levels. However, this also meant the weakening of the oligopoly power of the IPC and a higher degree of competition in the world petroleum market. This, together with the imposition of compulsory oil import regulations in the US, explains the downward pressure on petroleum prices outside the US since the late 1950s, as is shown for the Venezuela fob average prices in **Figure 1**.

The government take per barrel, either as royalty or taxes, was a function of price. Thus, the downward price movement also affected the oil revenues of the exporting countries. This fact triggered the founding of OPEC in 1960, whose objective, as stated in its statute, was to 'devise ways and means of ensuring the stabilization of prices in international markets', as the way to defend the oil rent. It was not long before OPEC realized there was little it could do on its own to stop the price fall, since the member countries did not control production. Then, the effort was reoriented towards the defence of the absolute value of the rent per barrel, regardless of the price. This was achieved in the early 1960s with the 'expensing of royalties' and from the mid-1960s onwards through the introduction of 'tax reference prices', whereby the rent per barrel was isolated from the actual market price. How successful the oil countries were in this matter is shown in the case of Venezuela in **Figure 2.**

Thus the rent per barrel throughout the 1960s became a floor to falling prices and their downward movement had to be absorbed as both a reduction in the cost per barrel and a profit squeeze. The profit per barrel squeeze in the oil countries gradually eliminated the differential rent between production in the US and abroad, hitherto appropriated by transnational capital.

Decades of stable and competitive petroleum prices, and the intrinsic advantages of oil vis-a-vis other sources of energy, exponentially increased world oil demand and made it the most important source of primary energy. **Figure 3** shows world (excluding CPEs) inland consumption of crude oil and NGL between the mid-1950s and the mid-1980s. Demand was first concentrated in the US, where consumption was four times that of the non-US OECD by the early 1950s. OECD petroleum consumption grew fivefold between the early 1950s and the early 1970s. However, non-US OECD outpaced that of the US, increasing 15-fold during the same period, as these countries experienced falling real prices throughout the 1960s.

Figure 4 shows world (excluding CPEs) petroleum production. It can be seen how production was first concentrated in the US, and once Venezuela is brought into the picture, how the Caribbean basin was the first source of petroleum supply. As the IPC pricing mechanism evolved from the early 1950s onwards, the low cost Middle East crudes were brought on

stream and the main world source of supply shifted towards the Persian Gulf. As the world market became more competitive throughout the 1960s, production was concentrated in the countries with the lowest production costs, which were largely members of OPEC. Production in OPEC grew seven-fold, and 14-fold in its Middle East member countries, between the early 1950s and early 1970s. Thus, OECD demand growth in the 1950s and 1960s was largely supplied from production increases in the OPEC area. In particular, sharp non-US OECD demand growth throughout the 1960s had, as a counterpart, a proportional increase in Middle East OPEC petroleum production.

On the other hand, the profit per barrel squeeze and the pressure for ever higher rent levels discouraged investment in the world petroleum industry vis-a-vis exponentially growing demand and production in the 1960s. **Figure 5** shows world (excluding CPEs) petroleum capital and exploration expenditure in real terms (1967 as base year) between the late 1950s and mid-1980s, distinguishing expenditures in the US from the rest of the world. It can be seen how investment in the US remained almost constant between the mid-1950s and early 1970s, whilst in the rest of the world it grew very slowly vis-a-vis very rapid production growth. This fact can be appreciated in **Figure 6** where, on an annual basis, the ratio between capital expenditures and production is calculated for the rest of the world throughout the 1960s. The falling investment/production ratio during this period brought along the disappearance of petroleum production spare capacity by the early 1970s, thereby creating a very tight market which pushed prices upwards in what came to be known as the first energy crisis.

The market dynamics concentrated world production in the OPEC countries throughout the 1960s. Furthermore, as spare production capacity disappeared by the early 1970s, world demand became highly dependent on OPEC supplies, where two-thirds of world proven reserves were concentrated. The full exercise of such monopoly power by the OPEC countries meant the unilateral determination of the rent and in the last instance, unilateral control over production. The control of production and prices by the oil countries was to be the natural outcome of their economic and political development.

This objective was clearly stated in OPEC Resolution XVI.90 of 1968 entitled 'Declaratory Statement of Petroleum Policy in Member Countries', which represented a turning point in OPEC's petroleum policy stance. Resolution XVI.90 set forth a series of policies aimed at the increase of the absolute rent per barrel under the principle of 'changing circumstances'. Thus OPEC would take a more aggressive stance and would be prepared to take advantage of favourable market conditions in the early 1970s. The route to such a goal would depend on political circumstances, particularly on political events in the Middle East related to the Arab-Israeli conflict.

OPEC in driving seat

The early 1970s were characterized both by a very tight world oil market and a more aggressive attitude by the OPEC member countries. A series of well-known events culminated in the Arab oil embargo of October 1973, which made spot oil prices soar. Immediately after the embargo, the OPEC Gulf members unilaterally announced that from that moment on, actual market prices would be used as reference prices for tax and royalty purposes. This action was at once followed by the other OPEC member countries. Thus the international price of oil tripled in 1973. The events of October 1973 represented the *de facto* nationalization of the oil industry in OPEC member countries. OPEC countries had gained unilateral and sovereign control of rent, production and pricing. The transnational corporations were from then on reduced to the role of operators. Nationalization *de jure* was just a matter of time, when only a small fraction of the immense revenue increase was used by the oil nations to buy up the capital of the foreign petroleum corporations.

Consumer response

The rent increases of the last quarter of 1973 made the world energy markets realize how dependent they were both on oil as their main source of primary energy and OPEC as their main source of petroleum supply. In the first instance, the importing countries had no choice but to pay the monopoly rent demanded by the oil exporting countries. As an institutional response, the industrialized countries created the International Energy Agency (IEA) in 1974. The basic task of the IEA has been to reduce OPEC monopoly power over the world petroleum and energy markets. Under the coordination of the IEA, the industrialized countries began to implement processes oriented towards both increasing their overall energy efficiency and diversifying their pattern of energy consumption.

The sharp price increase imposed by OPEC stimulated petroleum exploration and production worldwide, as witnessed by the sharp increase in capital and exploration expenditures from the early 1970s onwards, shown in **Figure 5**. This brought along an increase in non-OPEC petroleum production, as can be seen in **Figure 4**. As a matter of fact, OPEC production peaked in 1977.

Trial and error

Since the OPEC countries have been free to determine unilaterally the rent per barrel, differences in their individual rent preferences have shown up. The evo-

Figure 5. Oil industry real expenditures ($bn)

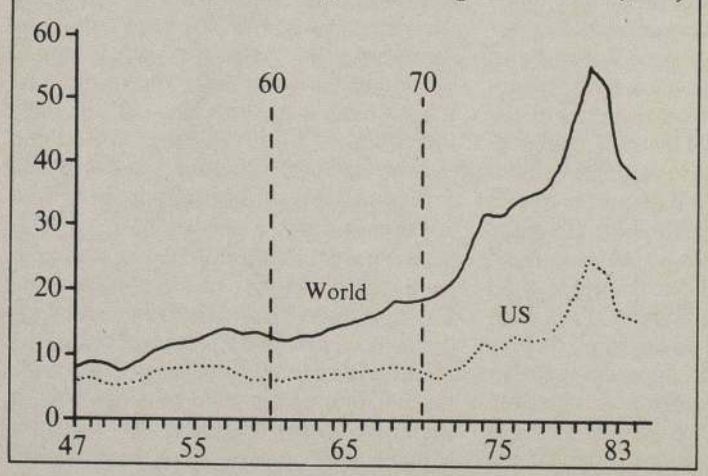
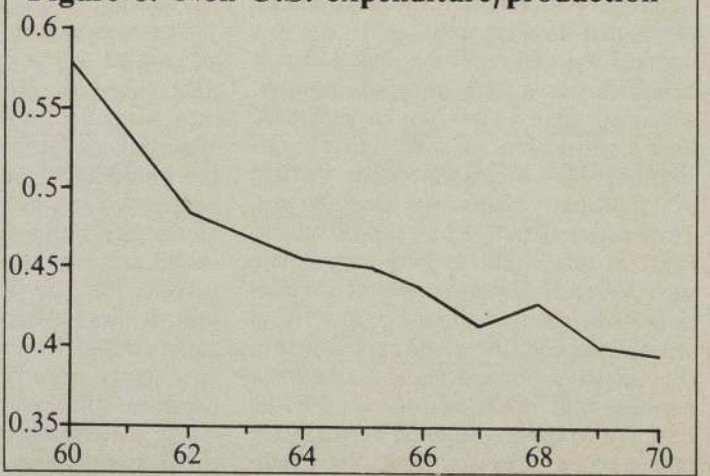


Figure 6. Non-U.S. expenditure/production



lution of OPEC oligopolist behaviour since then shows how the Gulf Cooperation Council (GCC) countries, led by Saudi Arabia, have opposed rent increases within OPEC which they regard as a threat to the competitiveness of their large petroleum reserves. Moreover, given their large installed and potential production capacity, these countries are in a better position to maintain a desired rent revenue with volumes.

Saudi Arabia and its allies within OPEC successfully opposed attempts by other members to increase the rent per barrel after 1974 and up to late 1978. The rent per barrel actually fell in real terms during this period. From late 1978 to late 1981, in the midst of a speculative market associated with the Iranian crisis, countries within OPEC which are short run maximisers sharply increased their export prices more than twice, in nominal terms. Saudi Arabia followed the rent increases by most OPEC members after a time lag. Moreover, it maintained full production capacity in order to soften the market. By mid-1981 Saudi Arabia was producing half of OPEC's output.

The world energy market reacted much faster to the second rent boom. There was an immediate improvement in energy efficiency and a faster movement towards other energy sources. This provoked a sharp drop of OECD oil consumption until 1983, remaining stagnant until 1985, as shown in **Figure 3**. On the other hand, non-OPEC production increased 25 percent between 1979 and 1984.

OPEC first perceived the softening of the market as being a production excess of its own. Under the leadership of Saudi Arabia and Kuwait, OPEC agreed on the adoption of official production ceilings and a slight price reduction in March 1983. The idea was to stabilize the markets and, after a stabilization period, the call on OPEC supplies and prices would both rise. Under the same reasoning the ceiling was further reduced in October 1984. By 1985 it became clear that the problem was not one of volume but prices. The rent per barrel OPEC was aiming for, was too high and under that umbrella, non-OPEC production and other energy sources were growing. By mid-1985, Saudi Arabia unilaterally annnounced the so-called market-share strategy, whereby it would reduce the rent per barrel to such a level as to regain market share. This strategy was endorsed by OPEC as a whole in December 1985.

The new strategy brought along the price collapse of 1986. From late 1986 up to the present, OPEC has been aiming to stabilize the market but at much lower price level. OPEC output has grown 25 percent since 1985 and world petroleum consumption has increased between 2 percent and 3 percent yearly during the same period. This has been the consequence of a more competitive price level once the rent per barrel was reduced. Furthermore, the lower price level has slowed down the processes of improving energy efficiency and fuel substitution. Two scenarios can be developed in order to discuss the future evolution of the world petroleum market.

Cyclical confrontation

This first scenario foresees a repetition of the pattern followed by the world petroleum market in the last 15 years. The logic behind the scenario is that low rent levels would allow both OPEC to regain monopoly power in the world petroleum market and oil to increase its share of the world energy market. Furthermore, as OPEC oil becomes more competitive and output grows, the higher level of capacity utilization reduces the relative market power of those countries with large reserves and production capacity vis-a-vis the short-run rent maximizers. Thus, the latter are in a condition to push for the highest possible rent which, in turn, causes a renewed drive towards increased energy efficiency and fuel substitution. These processes reduce OPEC monopoly power, forcing it to reduce the rent level, giving birth to a new cycle.

As the world energy and petroleum markets are ostensibly more competitive than they were in the 1970s, the magnitude of future rent increases will probably be much lower than in the past. The amplitude of future rent cycles under the confrontation scenarios will depend, on the one hand, on the capacity of the IEA to foresee the strengthening of OPEC monopoly power and to take adequate defensive measures; and on the other hand, on the capacity of those OPEC countries which are long-term rent maximizers to maintain adequate spare capacity to enforce their preferred rent level.

Within the described dynamics, the rent will be fluctuating due to the action of two poles with opposing interests: the oil exporting countries, owners of the resource led by OPEC, aiming for a high rent and the oil importing countries led by the IEA, aiming for low prices. In as much as there are divisions within OPEC with regard to their preferred rent per barrel between short and long-term rent maximizers, there are also divisions within the IEA with regard to an optimum price. There are oil importing countries which are at the same time important crude oil producers. These countries will oppose prices falling to levels that would threaten their indigenous production. This is clearly the case for the US. The same logic applies to those oil importers which are producers and importers of other energy sources. These countries prefer oil prices that protect their indigenous energy production and that enable them to maintain a diversified energy import pattern. This is the case for the European countries. Finally, there are those countries which greatly depend on imported sources of primary energy and prefer the lowest oil prices. These include industrializing countries, particularly those in the Pacific Basin.

To sum up, at high price levels, the oil importing IEA countries show a high degree of cohesion in order to reduce prices, whilst the exporting OPEC countries show lesser cohesion with regard to the highest optimum rent level. As the rent level is reduced, there is lesser cohesion among the importing IEA countries, whilst that of the exporting OPEC countries increases against what is perceived by all as too low a rent level.

Stable agreement

Following the Ricardian model, differential rent is the logical outcome of market forces, due to natural differences in productivity of petroleum reservoirs. The appropriation of differential rent by the owner of the resource, is the consequence of competition among lessees. This is the true basis of OPEC's indisputable success. However, as far as OPEC attempted to impose a monopoly rent beyond these limits, the consuming IEA countries reacted strongly and successfully in order to reduce OPEC monopoly power. These historical facts may constitute the basis for a long lasting agreement between the two parties.

Hence, let us consider another scenario, where the basis of a price agreement would be the cost of production of either petroleum or energy substitutes in the oil importing countries. This would constitute an objective reference to determine the price of traded oil. The price of traded oil would be determined by the price set in the consuming countries, which would secure for them a certain degree of energy self-sufficiency. However, all differential rent would be appropriated by the exporting nations. Likewise, the mechanism for a worldwide regulation of production and prices could be essentially the same as that used by the IPC and the US government between 1935 and 1958.

The mechanism described implies an automatic trade-off between prices and volumes. If the importing countries seek to increase their degree of self-sufficiency by maintaining a high domestic price, the exporting countries would see their markets reduced but would get a higher price.

On the contrary, at lower prices the importing countries would reduce domestic energy production and increase their imports. Furthermore, an important element of stability under the agreement scenarios would be the linking of capital between exporting and importing countries all along the petroleum chain. In this sense, downstream capital investment by the exporting countries in order to secure outlets for their production, combined with capital investments by the importing countries upstream in the exporting countries to secure supplies, would very much bring stability to the market. But, it has got to be emphasized that the upstream investments must be contractually arranged in such a manner — some form of service contracts — as to prevent any dispute about the appropriation of ground rent.

Conclusion

A long period of stability in the world petroleum market came to an end because of the eruption of a distributive struggle between the petroleum capital of the consuming countries, and the Third World exporting nations as owners of the resources. Theoretically, on the basis of Ricardian rent analysis, this dispute could have a stable outcome. The last 15 years have witnessed how, on the one hand, the consuming countries have spent very large amounts of capital on projects oriented to developing alternative sources of energy which were not all successful; on the other hand, the oil countries have experienced extremely harmful economic crises as a consequence of the price collapse. Hence, there is sufficient evidence to suppose that a possible agreement, on the lines of the one described, to stabilize the world petroleum market would favour both parties.

The author is indebted to Bernard Mommer, Klaus Nusser and Luis Pacheco who usefully commented on earlier drafts of this paper. Also thanks to Maria Alexandra Behrens who prepared the figures.

The APT–ASTM–IP petroleum measurement tables — economic considerations

By EK Van Horne and HJ Linser, Jr, Mobil Oil, New York

The petroleum industry has a long history of developing and using voluntary consensus standards to ensure consistency in various practices throughout the industry, including assurance of equitable, accurate measurement, favouring neither the buyer nor the seller, in custody transfer situations. The standards development process is based on technical considerations, scientific and engineering data and information. Information gained through field experience, or technological advances, often leads to the technical revision of the standard.

At no time during the standards development process are economic considerations allowed to influence the technical content of a standard. These industry standards are voluntary (until a government agency elects to incorporate them by reference in relevant regulations). Each user of a standard retains the right to decide to use (or not use) any voluntary industry standard.

Since their publication in 1980, a growing majority of both producing and consuming countries throughout the world have now adopted revised petroleum measurement tables. A number of countries have chosen to continue to use the previous edition of those tables. This article, which is based on eight years of industry experience with the revised tables, is an effort to encourage worldwide adoption of the revised tables to promote industry uniformity, while addressing the non-technical factors which may influence various countries' decisions not to adopt the revised petroleum measurement tables.

Background

Petroleum Measurement Tables are used worldwide in custody transfer. The tables are used to convert bulk volumes measured at observed temperatures to a fixed standard temperature of 60°F or 15°C. First introduced in 1917 and known as 'Table 6', the original tables were based on data from 18 US crudes and US refined products. They met the need in the US for a common reference standard. Applicability and accuracy were consistent with the requirements of that time. With the subsequent growth in the diversity of worldwide crude production, however, along with technological advances in measurements, the original tables became increasingly less valid. This was highlighted in the 1970s when several international crudes tested by Downer showed significant deviations of up to 0.3 percent from the old tables.

Recognising the need for updated information for the modern international petroleum industry, API and ASTM published revised tables in 1980 in both English unit and metric unit versions, and in three parts: American Table 6A (Metric Table 54A) for crude oils, 6B (54B) for products and 6C (54C) for special applications. In contrast to old Table 6 (54), revised Table 6A (54A) for crudes alone is based on data from 124 samples, representing approximately 100 crudes from around the world. These samples were tested by the US National Bureau of Standards (now the National Institute of Standards and Technology) using state-of-the-art measurement techniques. The New Tables resulting from this work are technically more accurate and commercially more applicable than the Old Tables. They have been approved by a number of standards societies including IP, ISO and OIML, as well as API and ASTM. Subsequent independent tests have further validated the data sets used to prepare the New Tables. The precision of the volume correction factors at a confidence level of 95 percent has been found to be excellent, ie, ±0.05 percent at a test temperature of 100°F.

Since the release of the New Tables in 1980, all major consuming countries, and many producing countries, have either already adopted them or plan to implement their use in the near future. At present about 70 percent of the total volume of crude oil production in the non-communist countries is measured on the basis of the New Tables, and this percentage will continue to increase. Some producing countries, however, have not yet adopted the New Tables and have preferred instead to remain with old Table 6. The reasons for not adopting the New Tables are not entirely clear but may reflect economic rather than technical considerations. Producers may be concerned that they will lose some revenues or incur higher costs if they convert. The purpose of this article is to shed some new light that may alleviate such concerns.

New Petroleum Measurement Tables

API 2540/ASTM D 1250/IP 200

	American	Metric
Crude oil	6A	54A
Products	6B	54B
Special applications	6C	54C

Temperature Correction Calculation

Table 6 vs. 6A difference

Example: Arabian light crude

	Old Table 6	New Table 6A
Observed density °API at 100°F	36.8	36.8
API gravity at 60°F	33.9	33.7
Transfer temperature °F	100.0	100.0
Volume correction factor	0.9824	0.9813
Net difference	0.0011	
Volume %	0.11	

Economic considerations

While volumetric differences arising from use of the New versus Old Tables will vary somewhat depending upon the specific characteristics of the oil and the magnitude of the actual temperature differentials involved, the average effect of the correction is estimated to be 0.1 percent. This means that the same standard barrel of crude, calculated on the basis of old Table 6, would be calculated as 0.999 barrels using Table 6A.

While the difference is very small and would hardly have been viewed as significant during the industry's rapid growth period of the 1970s, continued use of the old tables results in measurement inaccuracies which have an impact on both the buyer and seller. To a buyer, paying full market price today for oil measured using old Table 6, means spending money for volume not fully received. Translated in terms of price, the penalty seen by the buyer perhaps amounts to roughly 0.1 percent of the current price.

Looking at this matter from the producer's viewpoint, it may perhaps appear that a switch to Table 6A would have an equal and opposite economic impact on the supplier in the form of reduced revenue, and that only the buyer would benefit. This would certainly be true if the producing country was, in fact, exporting all that it could produce and was limited only by physical capacity constraints. In most instances today, however, and for the foreseeable future, this is not the case. Specifically, many OPEC members' production levels are today determined by the voluntary production limits they decide to set for themselves and not by capacity limitations. For such countries who have not yet adopted the New Tables, there are important economic considerations to take note of.

Total revenues intact

Total revenues will not be adversely affected by adopting the New Tables. Revenue barrels produced will continue to reflect the voluntarily set production level and general market conditions and will not be adversely affected by the choice of measurement tables are used. A country, for example, now limiting crude production to 1 million b/d and still using old Table 6 would, in fact, continue to maintain its decided limit at 1 million b/d under Table 6A. What would be affected is the amount of hydrocarbon contained in each calculated barrel, which would be somewhat greater than it was before. Total revenue barrels would remain unchanged. It is therefore not a question of revenue, but rather how much the 'extra' hydrocarbons may actually cost the producer.

The aggregate increase in the amount of crude oil produced, if the remaining producing countries were to switch to the New Tables, would amount in total to only about 10 to 15,000b/d as compared to current non-communist world consumption or between 45 to 50 million b/d.

This small increment would hardly be noticeable in the normal variations in worldwide demand and inventories.

Negligible cash cost

To a producer, the effective cash cost of adopting Table 6A would be no more than 0.1 percent of incremental production costs and should be negligible.

One could legitimately argue that it may be more appropriate to determine producer cost on the basis of the future market value of the extra volume of crude oil, rather than current incremental costs. The 0.001 barrel adjustment associated with adopting Table 6A may represent a volume that could otherwise be produced and sold in the future. This may be so, but even allowing for escalation in future market prices, the discounted value of 0.1 percent of a barrel of oil produced many years from now (in some cases 40 or 50 years or more) still amounts to only a fraction of a cent per barrel and does not materially change the basic producer's economics.

Countries Using New Petroleum Measurement Tables (6A/6B and 54A/54B)

API Ch.11.1/ASTM D1250/IP 200

Producing countries	Major consuming countries
Angola	Austria
Australia	Barbados
Brunei	Belgium
Cameroons	Chile
Canada	Cyprus
Colombia	Denmark
Denmark	Finland
Ecuador	France
Egypt	Germany
Gabon	Ghana
Kuwait	Greece
Mexico	Hong Kong
Nigeria	Italy
North Yemen	Japan (effective March 1990)
Norway	Netherlands
Peru	New Zealand
Republic of Congo	Peru
Trinidad	Philippines
United Kingdom	Puerto Rico
United States	Singapore
Venezuela	South Korea
Zaire	Spain
	Sweden
	Switzerland
	Taiwan
	Thailand
	Turkey
	Yugoslavia

Countries Remaining on Old Table 6, 54

Producing countries	Consuming countries
Algeria	Eastern Europe
Bahrain	India
China	
Indonesia	
Iran	
Iraq	
Libya	
Malaysia	
Oman	
Qatar	
Saudi Arabia	
Syria	
Tunisia	
UAE (Abu Dhabi, Dubai and Sharjah)	
USSR	

The greater accuracy in measurement of the crude will ultimately enhance market value. Market forces of course establish crude values. Refiners purchase crude streams on the basis of economic factors which include refinery yields, fob price, freight, expected loss and other costs. With the adoption of the New Tables, the loss experience will decline and over a period of time, the market value of crude measured by the New Tables will undergo a favourable adjustment.

Local industries benefit

Local industries in the producing countries themselves which buy fuel and feedstock for domestic consumption and for export sales will benefit. Adoption of Table 6A will be favourable to domestic companies as well as serving to improve the marketability of crude to foreign buyers. Indeed, because of the growth seen in the domestic economies of the producing countries over the past several years, local use of oil has increased significantly and today accounts for a substantial portion of total production.

Petrochemical and lube manufacturing businesses as well as refineries, power plants and other segments of the local economy are directly affected by how the producing country chooses to measure the oil it sells. There are actually some instances where local plants are buying fuel or feedstock measured on the basis of old Table 6 while exporting output on the basis of the New Tables, thereby placing themselves at a competitive cost disadvantage. As domestic and export oriented industries within the producing countries continue to expand, they will benefit more and more from the standardisation of industry measurement to be achieved by adoption of the New Tables.

Conclusion

There are sound technical reasons for producing countries to adopt the new Petroleum Measurement Tables. The Tables have been proven to be the most accurate means of standardising measurements to adjust for the temperature/volume characteristics of crude. This article has hopefully shown that adoption of the New Tables would not entail adverse economic repercussions for the remaining producers who have not yet implemented their use.

In a somewhat broader context, the New Measurement Tables represent simply one of many technical advancements the industry has made over the past few years to stay current, and on the leading edge of technology, with respect to custody transfer procedures. Examples of other changes that have already been fully endorsed and implemented by producing and consuming countries alike include use of meters instead of tank gauging, automatic sampling replacing spot manual sampling, and the Karl Fischer or Distillation tests for water in crude replacing the Centrifuge method. In some cases the producers benefitted monetarily and in others the consumers, but the primary motivation for change by members of the industry was and will, hopefully, continue to be further improvement in the accuracy and consistency of measurement techniques.

It is hoped, therefore, that producing countries which have been in the forefront of supporting these efforts in the past will also elect to accept the New Tables and thereby facilitate international commerce.

This paper was presented at the US Pipeline Conference in Dallas in April 1989.

12–13 September Guildford
Conference on 'The International Financial Regime'. *Details:* Continuing Education Office, University of Surrey, Guildford, Surrey GU2 5XH. Tel: (0483) 509373. Fax: (0483) 300803.

12–14 September Spijkenisse Netherlands
Course on 'Land Tank and Shipboard Measurement'. *Details:* The Course Manager, Redwood International Consultants Ltd, 29 Cambridge Park, Wanstead E11 2PU. Tel: (01) 989 5191. Fax: (01) 530 5547.

17–22 September Montreal
'14th World Energy Conference'. *Details:* DM Hammet, World Energy Conference, 34 St James's Street, London SW1A 1HD. Tel: (01) 930 3966. Fax: (01) 925 0452.

19–21 September Birmingham
Conference on 'Separation of Gases'. *Details:* Dr John Gibson, Royal Society of Chemistry, Burlington House, London W1V 0BN.

19–21 September London
Course on 'Flow Metering'. *Details:* The Course Manager, Redwood International Consultants Ltd, 29 Cambridge Park, Wanstead E11 2PU. Tel: (01) 989 5191. Fax: (01) 530 5547.

20 September London
Course on 'Maintenance of Subsea Production Systems'. *Details:* Society for Underwater Technology, 76 Mark Lane, London EC3R 7JN. Tel: (01) 481 0750. Fax: (01) 481 4001.

20–21 September London
Conference on 'Plastics Recycling — Future Challenges'. *Details:* Mrs S Tanner, Plastics and Rubber Institute, Conference Dept, 11 Hobart Place, London SW1W 0HL. Tel: (01) 245 9555. Fax: (01) 823 1379.

21–22 September Cannes
'Tecnon Petrochemical Seminar'. *Details:* Ms A Miglio, Parpinelli Tecnon Srl, Via Egadi 7, 20144 Milano, Italy. Tel: (02) 498 01 41. Fax: (02) 469 20 22.

25–28 September Leeds
'Computer Integrated Process Engineering 89'. *Details:* Conference Section, Institution of Chemical Engineers, 165 Railway Terrace, Rugby CV21 3HQ. Tel: (0788) 78214. Fax: (0788) 60833.

Call for Papers

The 22nd International Symposium on Automotive Technology and Automation will be held in Florence, Italy between 14–18 May 1990, and will concentrate specifically on the topics of mechatronics (use of electronics for product design), testing engineering and reliability.

Authors wishing to give a paper at the symposium should submit the title and a short summary of 100–150 words before 30 November 1989 to:

ISATA Secretariat
42 Lloyd Park Avenue
Croydon
CR0 5SB

25–29 September Oxford
Course on 'Tanker Chartering and Supply — Tactics and Decision Making'. *Details:* The Registrar, The College of Petroleum Studies, Sun Alliance House, New Inn Hall Street, Oxford OX1 2QD. Tel: (0865) 250521. Fax: (0865) 791474.

26 September London
Conference on 'Independent Power Generation'. *Details:* Liz Wright, Inpower 89 Conference Secretary, Queensway House, 2 Queensway, Redhill, Surrey RH1 1QS. Tel: (0737) 768611. Fax: (0737) 761685.

26–28 September Nottingham
Symposium on 'Methane — Facing the Problems'. *Details:* Westrade Fairs Ltd, 28 Church Street, Rickmansworth, Herts WD3 1DD. Tel: (0923) 778311. Fax: (0923) 776820.

27 September London
Seminar on 'Energy and Enterprise'. *Details:* Steve Tyler, Public Relations Officer, Institution of Mechanical Engineers, 1 Birdcage Walk, SW1H 9JJ. Tel: (01) 222 7899. Fax: (01) 222 4557.

27–28 September Oslo
The fourth conference on 'The European Downstream Industries in a Changing Environment'. *Details:* Norwegian Petroleum Society, PO Box 1897 — Vika, 0124 Oslo 1, Norway. Tel: (47) 2833130. Fax: (47) 2830547.

2–6 October Oxford
Course on 'Economics and Operations of Bunkering'. *Details:* The College of Petroleum Studies, Sun Alliance House, New Inn Hall Street, Oxford OX1 2QD. Tel: (0865) 250521. Fax: (0865) 791474.

3 October Dunstable
Seminar on 'Safety and Environment Issues at Petrol Filling Stations'. *Details:* Mrs EM Taylor, 12 Harold Road, Barton-le-Clay, Bedfordshire MK45 4QQ. Tel: (0582) 882170.

3–5 October Plymouth
'Diving Acquaintance Course for Beginners'. *Details:* Society for Underwater Technology, 76 Mark Lane, London EC3R 7JN. Tel: (01) 481 0750. Fax: (01) 481 4001.

3–5 October London
Conference on 'Protecting the Environment from Hazardous Substances'. *Details:* Charles Simeons, 21 Ludlow Avenue, Luton LU1 3RW. Tel: (0582) 30965.

3–5 October Cyprus
Third annual Arab Press Service conference on 'Middle East Strategy to the Year 2002'. *Details:* Arab Press Service, 37 Woodville Gardens, London W5 2LL. Tel: (01) 997 3707.

4 October London
Conference on 'The Pacific Rim — Opportunities for Business in Energy Projects and Developments'. *Details:* Nadia Ellis, IBC Technical Services Limited, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (01) 236 4080. Fax: (01) 489 0849.

4 October London
Conference on 'Rapid Methods for Diagnosis of Microbial Problems in the Petroleum Industry'. *Details:* Caroline Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: (01) 636 1004. Fax: (01) 255 1472.

8–20 October Oxford
Course on 'Management of Shipping Costs and Revenues with Computer Applications'. *Details:* Mrs J Soper, Drewry Shipping Consultants Limited, 11 Heron Quay, London E14 9YP. Tel: (01) 538 0191. Fax: (01) 987 9396.

9 October London
Conference on 'Energy Policy and the Environment'. *Details:* UK-ISES, King's College London, Campden Hill Road, London W8 7AH. Tel: (01) 938 2919.

9 October London
Conference on 'Landward Oil & Gas'. *Details:* Nadia Ellis, IBC Technical Services Limited, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (01) 236 4080. Fax: (01) 489 0849.

9–12 October Warwick
Course on 'Managing Major Emergencies'. *Details:* Petroleum Training Federation, Room 236, 162/168 Regent Street, London W1R 5TB. Tel: (01) 439 2632.

9–13 October Mombasa, Kenya
Course on 'Land Tank Measurement, Shipboard Measurement and Flow Metering'. *Details:* The Course Manager, Redwood International Consultants Ltd, 29 Cambridge Park, Wanstead E11 2PU. Tel: (01) 989 5191. Fax: (01) 530 5547.

10–11 October London
Seminar 'Diesel Fuel Injection Systems'. *Details:* Vanessa Whitehead, Institution of Mechanical Engineers, 1 Birdcage Walk, London SW1H 9JJ. Tel: (01) 222 7899. Fax: (01) 222 4557.

10–13 October Florida
Meeting on 'Hazardous Substances and Oil Spill Response'. *Details:* Ray Sansone, ASTM, 1916 Race Street, Philadelphia, PA 19103, USA. Tel: (215) 299 5521.

11 October London
Conference on 'Modern Practice in Handling Aviation Fuel at Airports'. *Details:* Caroline

Little, The Institute of Petroleum.

11–12 October Bath
Symposium on 'Reliability on the Move — Safety and Reliability in Transportation'. *Details:* Ms A Enderby, The Safety and Reliability Society, Clayton House, 59 Piccadilly, Manchester M1 2AQ. Tel: (061 228) 7824.

12 October Cranfield
One day seminar on 'Flow Measurement Update'. *Details:* Miss B Baines, School of Mechanical Engineering, Cranfield Institute of Technology, Bedford MK43 0AL. Tel: (0234) 752766. Fax: (0234) 750728.

16–18 October Los Angeles
'Energy Markets in the 1990s and Beyond' sponsored by IAEE and UNIEE. *Details:* Joan Walsh Cassedy, IAEE, 1133 15th Street, NW Washington DC 20005.

17–19 October London
Course on 'Offshore Pipeline Engineering'. *Details:* Nadia Ellis, IBC Technical Services Ltd, IBC House, Canada Road, Byfleet, Surrey KT14 7JL. Tel: (01) 236 4080.

18 October London
Course on 'Drilling for Engineers'. *Details:* Society for Underwater Technology, 76 Mark Lane, London EC3R 7JN. Tel: (01) 481 0750. Fax: (01) 481 4001.

18–20 October Stavanger
Conference on 'Structural and Tectonic Modelling and its Application to Petroleum Geology'. *Details:* Norwegian Petroleum Society, PO Box 1897 — Vika, 0124 Oslo 1. Norway.

19–20 October London
Conference on 'Oil and Money in the 1990s'. *Details:* Jennifer Bielenberg, International Herald Tribune, 63 Long Acre, London WC2E 9JH. Tel: (01) 379 4302. Fax: (01) 240 2254.

22–24 October Calgary
Conference on 'International Oil and Gas Markets'. *Details:* Conference Division, Canadian Energy Research Institute, 3512–33 Street NW, Calgary, Alberta, Canada T2L 2A6. Tel: (403) 282 1231. Fax: (403) 284 4181.

Petroleum Training Federation

Workshops on 'Implementing the COSHH Regulations'.

5 September Epping
12 September Bristol
19 September Coventry
26 September Darlington
3 October Huddersfield
10 October Livingston

Details: Mrs Christine Lavelle, PTF Training Administrator, Room 326, 162–168 Regent Street, London W1R 5TB. Tel: (01) 439 2632.

23 October London
Conference on 'North Sea Gas Liquids — The Commercial Challenge'. *Details:* Overview Conferences, 19 Barlby Road, London W10 6AN. Tel: (01) 969 1982. Fax: (01) 960 8850.

23–27 October Nigeria
Course on 'Land Tank Measurement, Shipboard Measurement and Flow Metering'. *Details:* The Course Manager, Redwood International Consultants Ltd, 29 Cambridge Park, Wanstead E11 2PU. Tel: (01) 989 5191. Fax: (01) 530 5547.

24–26 October London
'Sign International '89'. *Details:* Louise Levy, Batiste Exhibitions, Pembroke House, Campsbourne Road, Hornsey, London N8 7PE. Tel: (01) 340 3291.

25 October London
Conference on 'International Trade in Natural Gas'. *Details:* Caroline Little, The Institute of Petroleum.

29 October–3 November Moreton-in-Marsh
Course on 'Handling Emergencies in the Oil Industry'. *Details:* Fire Service College, Moreton-in-Marsh GL6 0RH. Tel: (0608) 50831.

30 October London
Seminar on 'Energy: Today's Decisions, Tomorrow's World'. *Details:* Geraldine Oliver, Information Officer, The Watt Committee on Energy, Savoy Hill, London WC2R 0BU. Tel: (01) 379 6875. Fax: (01) 240 7735.

6–8 November Amsterdam
Course on 'Cost/Planning/ Economics for North Sea Projects'. *Details:* The Center for Professional Advancement, Palestrinastraat 1, 1071 LC Amsterdam, The Netherlands. Tel: (020) 6623050. Fax: (020) 797501.

7 November London
Conference on 'Oil Supply and Price'. *Details:* Caroline Little, The Institute of Petroleum.

7–8 November Maidstone
Conference on 'The Challenge of Fundamental Change in Europe's Gas Markets'. *Details:* Overview Conferences, 19 Barlby Road, London W10 6AN. Tel: (01) 969 1982. Fax: (01) 969 8850.

7–9 November Aberdeen
Subtech '89 Workshop. Organised by Association of Offshore Diving Contractors and Society for Underwater Technology. *Details:* SUT, 1 Birdcage Walk, London SW1H 9JJ. Tel: (01) 222 8658.

12–18 November Caracas
'VII Venezuelan Geological Congress'. *Details:* Anibal R Martinez, Pres. Organisation Committee, Centro Seguros La Paz, Petroleos de Venezuela, 3ro AV. Francisco de Miranda, Caracas 1070, Venezuela. Tel: (+58 2) 239 1829–2084. Fax: (+58 2) 606 4963.

13–15 November London
Conference on 'Power Generation and the Environment'. *Details:* Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1H 9JJ. Tel: (01) 222 7899.

14–16 November Singapore
Conference and Exhibition 'The 4th ASEAN Council on Petroleum'. *Details:* Times Conferences Pte Ltd, 19 Tanglin Road, #12–02 Tanglin Shopping Centre, Singapore 1024.

14–17 November Milan
Conference on 'Engineering Solutions for Corrosion in Oil & Gas Applications'. *Details:* Prof RN Parkins, Department of Metallurgy and Engineering Materials, The University, Newcastle-upon-Tyne NE1 7RU. Tel: (091) 222 7905. Fax: (091) 261 1182.

15–16 November London
Conference on 'Risk Assessment for the Offshore Industry'. *Details:* Nadia Ellis, IBC Technical Services Limited, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (01) 236 4080. Fax: 489 0849.

16 November London
Conference on 'Cost Reduction Offshore — The Way Ahead'. *Details:* Caroline Little, The Institute of Petroleum.

16–17 November Runnymede
Course on 'An Appreciation of Aviation Fuel & its Quality'. *Details:* Dr EM Goodger, Route South-West Ltd, 78 Church Road, Woburn Sands, Milton Keynes MK17 8TA. Tel: (0908) 582120. Fax: (0784) 435383.

19–24 November
Course on 'Managing Major Emergencies'. *Details:* Fire Service College, Moreton-in-Marsh GL6 0RH. Tel: (0608) 50831.

21–22 November Stavanger
'ONS-Advanced Petroleum Conference'. *Details:* Siv Aasland, PO Box 175, 4001 Stavanger, Norway. Tel: (+47) 4 55 81 00. Fax: (+47) 4 55 22 70.

22 November London
Conference on 'Automotive and Industrial Fuel Combustion-Environmental and Health Implications'. *Details:* Caroline Little, The Institute of Petroleum.

28–30 November London
Course on 'Land Tank & Shipboard Measurement'. *Details:* The Course Manager, Redwood International Consultants Ltd, 29 Cambridge Park, Wanstead E11 2PU. Tel: (01) 989 5191. Fax: (01) 530 5547.

29 November London
Workshop on 'Standards of Competency'. *Details:* Alan Lodge, The Institute of Petroleum.

Fighting the forecourt sign war

By Stephen Read, Marketing Director, *Hawes Signs and Image Maintenance*

Aggressive price wars on the part of oil companies, which in the past attempted to woo motorists on the basis of lowest price, have given way to equally determined re-imaging in the bid to present motorists with a consistently high image of authority and reliability on the forecourt.

The latest design for BP

BP are the latest to join the fray and Hawes Signs, which work on behalf of most major oil companies, are producing and supplying many of the signs to BP outlets throughout the United Kingdom — a £5 million contract — which are being totally revamped as part of a multi-million pound, worldwide reimaging exercise, indicating just how much importance the multi-national oil companies now place on projecting the right corporate image.

The attention now being directed towards forecourt identities coincides with a general shift away from the traditional *raison d'etre* of garage owners and managers. The nature of service stations has changed dramatically over recent years and the sale of petrol is no longer the sole guarantee of commercial success. Retailers have had to come to terms with the emergence on their forecourts of mini-supermarkets, stocking everything from garden furniture, videos and newspapers to hamburgers, groceries and even clothing. No-one would deny that significant profits are to be made by successfully retailing a wide range of goods associated with the needs of the occupants rather than just the vehicles.

The traditional image of a petrol station littered with second-hand cars, housing the inevitable workshop spilling spare parts onto the forecourt, has been replaced by gleaming pumps, smart new signage and glass-fronted shops stacked high with tempting consumer goods.

Vital image

Effective communication of the correct image is undoubtedly a major factor in all successful retailing and small private operators are able to project the authority and reliability of multi-national oil companies. Not least of these advantages is the fact that shoppers are always sure of being able to drive onto the forecourt, of long opening hours, convenient location, payment by credit card if necessary and of fast service in an environment where staff are used to completing a transaction quickly and efficiently in order to send the motorist on his or her way as speedily as possible.

However, the single most important advantage that garage owners enjoy is the backing of multi-national oil companies, whose investment in image and appearance allows small operators to compete on equal terms — certainly when it comes to presenting an efficient, professional appearance — with larger operators including high street chains.

BP's new appearance is undoubtedly the most topical and it remains to be seen how powerfully the 'greening' of their stations will influence consumers. First impressions are certainly favourable — 'A big improvement', 'Much better on the eyes', 'It looks a lot healthier', 'A definite improvement on the old stuff', 'Distinctive, explicitly BP', are just some of the comments reported following market research.

Updating the worldwide image of a major brand like BP is a colossal undertaking but one which BP believes will result in increased sales on petrol forecourts and in the forecourt shops. The roll-out programme began in earnest on 3 July and by the end of 1990 the programme will see the transformation of nearly 2,000 BP retail sites, averaging about 25 a week.

Colour impact

The colour green makes an undoubted impact on motorists pulling into one of the new BP sites, a colour which psychologists and design specialists claim conveys an impression of quality, vitality and freshness — exactly the impression BP wants to convey. Although green has always been associated with BP, design consultants Addison were brought in to find a richer green than before, using the familiar yellow as a subsidiary colour to support and accentuate the green.

The approach edge to the canopy on certain sites receives a bullnose treatment, incorporating a green neon strip, illuminated day and night, and 'BP' in cannister letters. Flat cladding is used on the other canopy edges. The new gantry sign is particularly effective at night, when the green vanishes to leave the illuminated BP shield 'floating' in the darkness. Pumps are green with a yellow stripe and white band at the base, with product identification in yellow letters out of the green background. Above the pumps, internally illuminated spreaders will carry the BP logo and product identification and a variety of methods of suspending spreaders have been devised to meet the needs of different sites. Even the car washes will eventually be fitted with two-tone green brushes! The building itself will be painted neutral to highlight the corporate colours and the lighting changed from sodium based yel-

low to metal halide to give a cleaner, very white light.

The all-important BP shield logo, which has undergone several major changes since it first appeared back in 1920, now appears against the new BP green background, outlined in yellow with the forward-facing BP letters also in yellow against green, summing up the spirit of BP 'on the move'.

The roll-out programme of re-imaging 2,000 retail sites is controlled and administered by BP with military-like precision. Twenty-one frontliner teams and two sweeper teams are being provided by eight contractors.

BP's re-imaging project may be the most ambitious undertaken recently by the major oil companies but none has been complacent over the past few years.

Retail identification

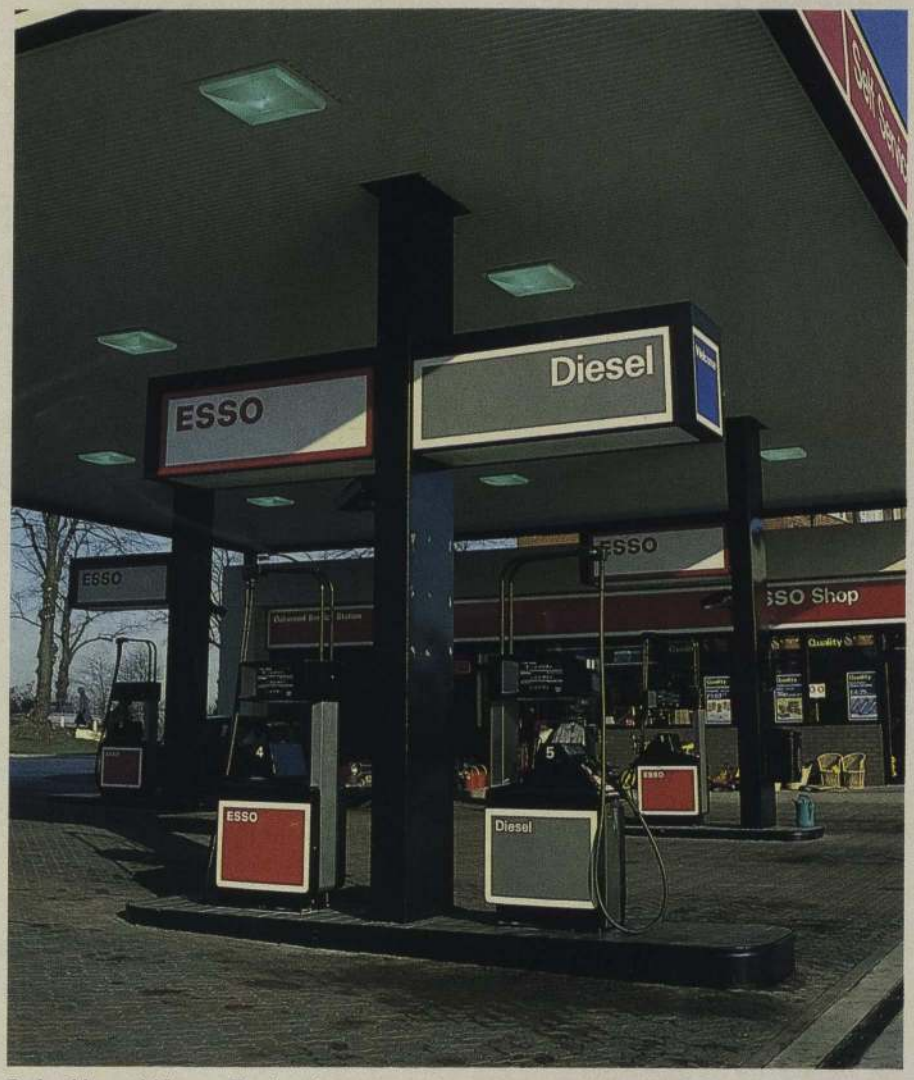
Esso, which in 1986 was the first UK oil producer to introduce unleaded petrol, has been carrying out a service station redevelopment programme for the past 10 years. The Esso Retail Identification Concept, ERIC, aims to 'convey information in every part of the station in a clear, precise way.' The principal message to drivers is one of 'co-ordinated efficiency and clear modern design.' Red, white and 'motorway' blue are the instantly recognisable Esso colours, used on forecourts in colour blocks for ease of identification.

Each year some 150 million motorists visit the 800 plus Esso shops which have also been evolving to fit in with the latest style of station.

Esso shops promote the idea of 'one-stop family shopping' and present a well-lit, well-designed and comfortable interior, with less emphasis on motoring distress purchases and more on appealing consumer goods. Like all major oil companies, Esso is working to promote common high standards of appearance and operation throughout the United Kingdom. Since almost two-thirds of the Esso stations are owned by independent retailers, considerable effort has been made to convince retailers of the benefits of maintaining such high standards of operation. One of the ways in which that is done, is through considerable support packages, including highly informative print material. The Esso Retailers Guide sets out the principles of Esso shops and gives valuable advice on merchandising, promotions and display material as well as staff selection, training and retail automation.

Separate shop

The Jiffy network of shops, now being included on all Jet redevelopment site programmes, was deliberately planned to bear a separate identity from the Jet forecourts, thereby creating an environment not immediately associated with a 'garage shop' and attracting local pedestrian customers as well as passing motorists. The 50th Jiffy shop opens in August.



Red, white and blue — Esso's colours

Retailing success undoubtedly relies to a large extent on projecting the correct image, not only within the forecourt shop, but also on the forecourt itself which is where motorists and pedestrians gain their first impression of a service station.

Maintaining that image is just as important as creating it which is why major petrol companies use an organisation like Image Maintenance. Image Maintenance offers a service backed by teams of electricians, plumbers, carpenters, roofers, glaziers and specialist cleaners who make regular visits to sites with the object of making them look as good as new. Cleaning and maintaining the signs, removing petrol spillage, cleaning guttering, replacing lamps and regular repainting are all carried out as part of a planned maintenance contract while remedial maintenance ensures that if emergencies occur, a team of specialists can be on the spot quickly to carry out the necessary repairs.

Creating and maintaining the correct image is undoubtedly a major factor towards successful retailing.

Book Review

Paul Frankel: Common Carrier of Common Sense

Edited by Ian Skeet with epilogue by Robert Mabro
Published by Oxford University Press, 1989, 318 pages

Reviewed by Sir Geoffrey Chandler, OBE

For some 60 years Paul Frankel has been associated with the oil industry. For more than 40 years he has written about it — rationally, elegantly, consistently. This awkwardly titled volume of selections from his writings from 1946–88, skilfully edited by Ian Skeet, is an appropriate tribute to Frankel at 85 — to a man whose independence of mind, quality of intellect and steadfastness of character have enabled him to grow from someone initially regarded as no more than an irritant gadfly to the most distinguished oil consultant in the world today.

In a brief and stimulating epilogue, Robert Mabro lists five 'authorities' who have had a significant influence on our understanding of oil matters — Frankel, Levy, Adelman, Penrose, and Jablonski. Among these he concludes that Frankel's contribution to oil economics has been less substantial than the others but his influence on doers in the industry much more considerable.

I believe this to be a just verdict. Frankel is essentially a teacher whose books and other writings have been only a part, though a significant one, of a teaching contribution which, as Mabro comments, has left its mark on several generations of men and women in companies and governments. The generosity of spirit which characterises the good teacher, particularly in encouraging the young, marks Frankel out. For him the spoken word has been as important as the written page and countless men and women have profited from this and have reason to be grateful.

Yet it is also true that *Essentials of Petroleum*, published in 1946 (an abridgement of this forms the longest section of this compilation) has proved a seminal work, better known than any book on oil, other perhaps than populist works of dubious accuracy. It provided the consistent and coherent framework of thought about the oil industry which informed all Frankel's subsequent writing. Written in his early 40s, it lacks the stylistic elegance and felicity of phrase that were to come later, having the didacticism, even a stilted self-consciousness, of a writer testing his wings. Yet the vividness of metaphor and image is already discernible, as is the facility with languages which would later provide, for example, the incomparably apt translation of *trahison des clercs* as 'the defection of those who ought to know better'.

But the substance of *Essentials* was and is of fundamental importance. The fact that the oil industry is not self-adjusting — at least in the short term — imbued all his thinking. The aleatory nature of exploration, the relationship of fixed and variable costs, the price inelasticity of both supply and demand and thus the menace of the marginal barrel, meant that some management of supply was the only alternative to violent fluctuations damaging to all involved.

That management he judged — whether it was by the majors or OPEC — on the grounds of its efficacy rather than on its matching of some ideological requirement. He recognised the necessary interest of government in oil matters, chiding those who spoke of governmental 'interference'. Oil, he said, adapting Clemenceau, is too serious a matter to be left to the oil men.

Frankel came back again and again to questions of structure and to the question of price which is inexorably associated with it. A 'free' market, he points out, oriented solely towards lowest cost oil, is an unworkable alternative to some system of management with a latent surplus of supply maintaining a downward pressure on price. The brief chapter, 'Is there a just price for oil?', should be compulsory reading for governments, though perhaps it is only the British government among oil producers which believes its own rhetoric about 'free markets' while profiting from the safety net provided by OPEC — or suffering when that safety net, from which it has pharisaically stood apart, is rent.

We are fortunate that Paul Frankel has been of our generation. He has witnessed and commented with consistent objectivity on the influences underlying the most radical changes of structure and ownership that the oil industry is ever likely to see. He recognised the essential interdependence of its component functions; he saw, with a clarity denied to most, that the lack of any inherent self-adjustment required some institutional ballast, whether this was the major companies, OPEC or something else. He was interested in observing analytically, not in judging emotionally. *Faute de mieux* he would say of the majors to audiences less dispassionate than he, *on couche avec sa femme*.

Finally, Frankel revelled in ideas. He recognised, as to their cost so few managers do, that companies operate in a market-place of ideas as well as of products and that in the long run ideas are the more potent. That he could articulate them so clearly and attractively for so long meant that he himself became far more than an academic commentator. His cumulative influence has been a real contribution to limiting the inherent instability of the industry and to holding the increasingly numerous players in the game back from the abyss of the unbridled pursuit of the marginal barrel.

This book will give stimulus and enjoyment to successive generations of oil men and women. It will have relevance and importance for as long as oil is produced and sold — which will be for a very long time yet.

The concrete solution for marginal fields

The concrete gravity structure during its successful inclined installation last month at the Ravenspurn North development, operated by Hamilton Brothers. Designed by Ove Arup and constructed by John Laing ETE Ltd, it is a shallow water version of the platforms described in this article.

By Ralph Walker and Lorne Gifford, Offshore Design Engineering and Loïc Des Deserts, Doris Engineering

A new generation of safe, highly cost effective twin tower concrete platform has been developed, suitable for 70 to 140 metre water depths. The use of two towers allows the accommodation module, helideck and communication systems to be housed separately from the potentially hazardous drilling and processing modules, considerably improving personnel survival rates in the event of large scale fires and explosions.

By omitting oil storage facilities and installing the deck

and topsides offshore, the platforms are sufficiently light to be built entirely within a dry dock. This allows simple conventional onshore high-rise construction techniques to be used in a fast, low-risk and low-cost programme. For a platform structure fully installed in 100 metres of water, ready for 15,000 tonnes of topsides, the cost is less than half that of equivalent twin steel jackets.

The role of concrete platforms

Concrete platforms have historically been associated with large, technically complex, high budget developments. A requirement for substantial crude oil storage and the ability to mate the deck and topsides to the substructure in sheltered inshore waters were the usual reasons for their use. The amount of concrete used for such structures has, not surprisingly, been large, leading to high costs and long construction periods.

The advent of modern heavy lift barges able to install integrated decks, large modules and now a complete topside unit has resulted in faster offshore installation and hook-up times. Combined with the longer offshore construction season afforded by these vessels, the traditional advantage of an inshore hook-up for conventional concrete gravity platforms has become far less important.

The North Sea and Gulf of Mexico have developed extensive pipeline networks, and sufficient infrastructure and expertise now exists to lay new lines and tie into the existing ones relatively cheaply and quickly. Thus the other great advantage of the original concrete platforms, their ability to store large amounts of crude, has as a result also become far less important.

With the redundancy of these former advantages, new concrete developments have tended to be limited to those areas where the environment prohibits the use of piled steel jackets or where lack of infrastructure necessitates a major oil storage facility. Typical future developments are Hibernia, in an ice infested region off the coast of Canada and Troll, located in over 300 metres of water on the poor clay soils of the Norwegian trench.

The current ability to install the deck and topsides offshore can, however, equally well be applied to a concrete support structure. Continuing in-house research and development has resulted in a structure optimised for current offshore techniques which is fully competitive with modern steel jackets.

Safer platform layout

An offshore oil or gas platform has several distinct roles to perform. These include drilling, whether for production or workover, processing the hydrocarbons for delivery to shore terminals and, where remote control of operations is not possible, workforce accommodation.

Accidents and failures in the processing equipment are the most frequent causes of dangerous incidents. The initial explosions on Piper Alpha occurred here, as did those that shut down the Brent and Cormorant fields earlier this year.

Accidents relating to drilling operations, such as blowouts, are far less frequent but potentially just as serious. The incident concerning Ocean Odessey, although occurring on an exploration rig and not a production platform, is such an example.

The current design philosophy for new platforms therefore strives to keep the processing modules as far away as possible from the accommodation, with drilling being slotted in between the two. However, even on a large platform this distance can rarely be more than 50 metres. Smoke and fire can, as a result, very rapidly engulf the accommodation, and those within it.

A recent study by the Offshore Certification Bureau and Technica concluded that the use of floatels, whether bridge linked or helicopter shuttle, increases the risk to personnel when compared with a separate fixed accommodation platform.

The solution then is to put the accom-

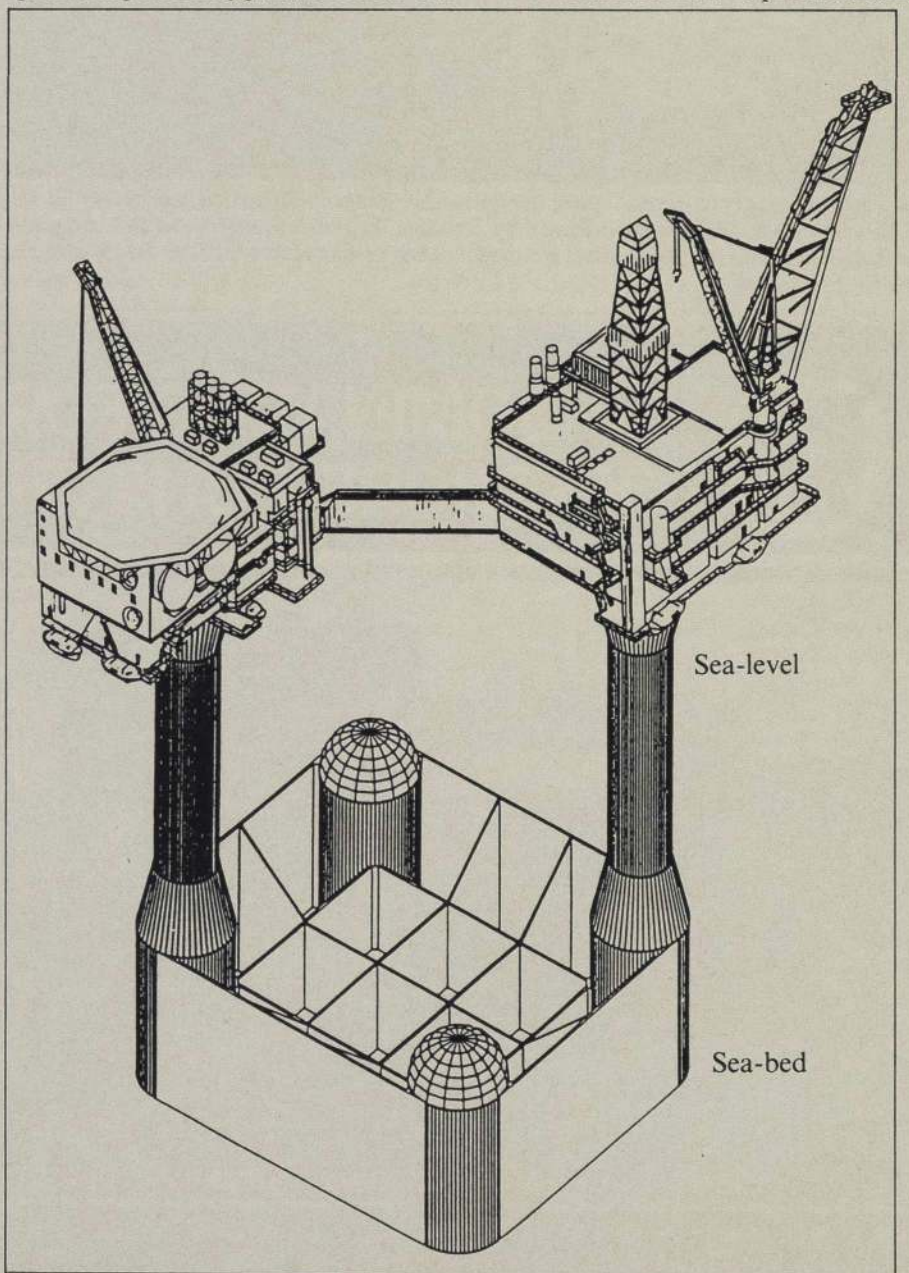


Figure 1 Twin tower concrete oil/gas platform

modation, and possibly the drilling unit as well, on a separate structure linked by a bridge to the processing platform but far enough away to survive a catastrophic destruction of it.

The new, safer platform concept developed by ODE/Doris Engineering allows the topside facilities to be separated in this way, while still only needing one platform substructure to be installed. This combines the cost advantages of a single platform installation with the safety advantages of two platforms.

The minimum concrete platform

This new generation of minimum weight concrete platform is sufficiently light to be entirely constructed in a dry dock. Previous structures have been too heavy to be floated out from a dry dock and the resulting need for an intermediate tow-out and completion of construction afloat added considerably to their cost, complexity and time of construction.

The simple, lightweight structure utilises proven construction techniques regularly used by onshore civil engineering contractors. A fast, efficient construction programme is therefore possible.

The design presented here is tailored for North Sea conditions with a water depth of 100 metres, medium foundation conditions and a combined topside weight of 15,000 tonnes.

The same basic design has been optimised for water depths of 70 to 140 metres and topside weights of up to 45,000 tonnes with no major changes.

The minimum concrete Gravity Base Structure (GBS) is composed of three elements:

- Twin corner columns to support the decks and house all conductors, risers and J-tubes.
- A foundation raft to transmit the forces to the soil.
- Two buoyancy chambers on the opposite corners to the main columns to provide additional stability during installation and removal.

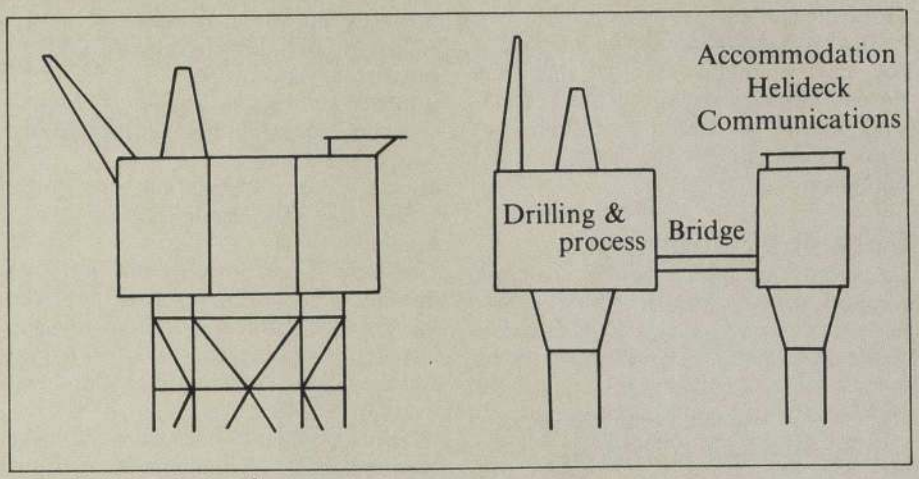


Figure 2 Safer platform layout

The GBS complies fully to British, American and Norwegian design codes and is explained in more detail below.

Support columns

The column supporting the process and drilling modules is intended to house all conductors, J-tubes and risers internally, protecting them from waveload, ship impact and any possible terrorist action.

Both columns are 12 metres in diameter in the wave load zone, increasing to 18 metres at the connection with the lower caissons. Their tops terminate in extended square annular beams which will receive the decks. These dimensions can be increased to allow a larger number of conductors to be housed or a larger deck footprint to be supported, with minimal overall effect on the cost of the structure.

An alternative option is to run the conductors outside the supporting column on a framework supported from it. The waveloading attracted by the conductors and framework is drag dominated and out of phase with that on the inertia dominated support column so there is no significant increase in total wave loading.

Foundation raft

Although its primary function is to transmit structural and environmental loads to the soil, the overall size of the foundation, a 70 by 80 metre rectangular raft, is dictated by its use as a flotation raft for tow-out of the GBS from a dry dock, with the two-out draught being limited to 10 metres to allow construction in a range of dry docks. One metre underbase skirts serve primarily to protect the base against the scour that frequently occurs in North Sea sands, although they will also aid in the shallow dry dock tow-out draught by containing an air cushion. Deeper skirts can be provided for poorer foundation conditions, with the tow-out draught being maintained by a corresponding increase in the underbase air cushion.

The foundation raft's exterior walls rise to 40 metres, while those in the interior are 15 metres high. They have no roofs and will contain loose sand ballast once the platform is on site.

The 100-year North Sea storm wave generates a maximum foundation corner bearing pressure below 40 tonnes/m^2, enabling the GBS to be used on sites with poorer soil conditions than are usually found in the North Sea, although they preclude use in areas of very loose sand or weak clays without an extended foundation raft and deeper skirts. The minimum bearing pressure under the gravity base is always positive so no stress rever-

sal of the soil occurs.

Since it is the tow-out draught and not the environmental loading that will normally govern the size of the foundation, a small increase in the raft size can allow substantially increased column diameters.

Buoyancy chambers

Located at opposite corners to the main columns, these chambers provide stability during passage to and installation at the site. They are cylindrical with an outer diameter of 18 metres and are 40 metres high with hemispherical caps.

During the operational lifetime of the platform the buoyancy chambers will contain sea water at hydrostatic pressure. At the end of production the decks and topsides will be removed by crane and the loose sand ballast dredged out. The buoyancy chambers can then be vented and the GBS refloated.

The platform can be positioned over a predrilled template by the use of docking piles installed with the template.

Costs

The fully installed structure costs less than half that of equivalent twin steel jackets. The budget estimate is based on average European prices and is fully inclusive of all costs involved in the design, construction and installation of the GBS.

Several million pounds are allocated for mobilisation and running of the construction site including dry dock refitting, the intention being to refit an existing establishment. Obviously the use of a fully operational dock would reduce this cost significantly.

Mechanical outfitting includes all necessary systems for installation and operation of the GBS as well as conductor guide frames. The main mechanical systems are:

- conductor guide frames (conductor pipes are excluded)
- water ballasting/venting system
- towing and mooring links
- docking piles for installation
- temporary steelwork
- power generators, fuel tank, control cabin, safety and other temporary equipment
- electrical/instrumentation for platform tow and installation
- anodes

Marine operations cover mooring installation, route surveys, tow-out from the dry dock, subsequent tow to field, installation, placement of sand ballast and the removal of temporary equipment within the GBS.

The mooring piles are assumed to have been installed with the template and the removal of the temporary deck can be performed immediately prior to the main deck or module support frame being installed.

Fabrication and installation

The complete structure, including the concrete works and all permanent and temporary mechanical items will be fabricated in the dry dock. The overall size of the structure in plan is 70 metres × 80 metres.

The structure is towed out with all cells dry and a 0.80 metre air cushion within the steel skirts and the concrete ribs. In this configuration the draft will be equal to 9.15 metres.

Those dry docks most likely to be used are designed for a maximum draught of 10 metres.

The towing out to the final site will be made with five tugs, 12,000–14,000 BHP, and at a draught of 30 metres. As soon as the water depth of the towing channel is large enough, the air cushion will be deflated, and the structure will be water ballasted to its towing draught.

On arrival at site the structure is first water ballasted up to the top of the caisson, leaving a nominal free board, and then into the column bases and buoyancy chambers.

If connection over a pre-drilled template is required, it can be achieved by the use of pre-laid moorings and docking piles, as used for Maureen. Otherwise positioning will be by acting on the tug lines.

Once on the sea bed the structure is completely water ballasted to ensure good skirt penetration.

The installation is then completed by placing the dredged solid ballast within the foundation raft. There is 78,000m^3 of ordinary sand ballast to be placed, bringing the submerged weight of the structure up to 110,000 tonnes and ensuring there will always be a positive contact pressure on the underlying soil. In the meantime, all temporary equipment will be removed to make the platform ready for deck installation.

Construction programme

Total project duration from the beginning of detail design and engineering until the platform is installed and ready to receive the deck and topsides is 14 months.

Four months are allowed for dry dock preparation and site mobilisation, although the start date for this activity can be brought forward by a month as the main dimensions and weights of the GBS will be fixed before detail design begins.

Future developments in the North Sea's medium water depth range will be on marginal fields where the current desire for a high safety profile clashes with the requirement for a cost effective platform.

The twin tower concrete gravity base structure described here provides that high-safety profile at a cost that is less than a single equivalent steel jacket. Combined with the fast, low-risk programme afforded by the use of onshore high-rise construction techniques, the package is unbeatable and heralds a new generation of safe, cost effective North Sea platforms.

New-generation construction for the North Sea

By Ian Biggins, Technical Director, Press Offshore Fabrications

One of the most notable developments in procurement for the North Sea in recent years has been the sharp increase in the sizes of new structures. Those who foresaw the imminent arrival of the 'big' module in the mid-1980s must be more than satisfied with their presence and, no doubt, gratified by the rapidity and extent to which their expectations have been realized.

This integrated deck was built by Press Offshore for the Morecambe Bay gas field.

From 2,000 to 2,500 tonnes in 1985, the typical offshore module grew in weight first to 4,000 tonnes by 1986 and, latterly, to well over 5,000 tonnes. Another Very Large Structure (to use the jargon), the integrated deck weighed in at 9,000 tonnes in the middle of 1988 with an order for one North Sea field to be followed a few months late by a contract for a similar structure of the same weight for another. Within four years the VLS had become reality.

Feasibility studies

Enlarged unitised structures such as these, have little to do with an unthinking notion that big must be good. They stem from an in-depth appraisal of the oil industry's future needs as expressed in feasibility studies carried out in collaboration with both design and fabrication sectors.

The studies in the early 1980s highlighted the valuable opportunities that would be opened up by the impending development of barges and ships able to transport and lift up to 10,000 tonnes at a time. Now available, this capability enables operators to realise several cherished ambitions, most of them vested in significantly bigger modular structures for platforms.

Of the benefits realisable from bigger modules, a major reduction in offshore hook-up and commissioning must rate as the most important. Offshore work is extremely expensive and a worrisome contribution to the total cost of field development. With fewer, larger and more integrated structures per platform, commissioning can be planned to allow much more to be undertaken in the fabrication yard at onshore rates. Since these can be as low as a fifth of offshore rates, and since safety standards are easier to maintain onshore, the financial and human benefits are plain.

Detailed assessments

This, then, is the reasoning behind the move towards bigger modules designed so that they can be fitted out and commissioned to the maximum extent in the fabrication yard. Although it is not wholly fair to say that their early arrival took fabricators unaware, it is nonetheless the case that not every contractor was prepared for the 'revolution.'

Those that were, had been careful to assess their resources and assets very closely well in advance of the new requirements. Everything came under the microscope, from management and manning procedures to work skills, yard capacity, loading ratings of assembly areas and quay edges, quayside water depths, and so on.

Such self-examination was vital. The implications for fabricators seeking to build VLS's are far-reaching. Not the least is that one of these large structures can spend a good deal more time onshore while the increased scope of work is performed. This means that a fabricator must have a yard (or yards) large enough or numerous enough to phase contracts if he is to be in a position to take on new work during longer precommissioning and commissioning campaigns.

Valid expectations

From experience so far, the fabricators now tackling these larger and heavier structures, believe that they can indeed help the oil companies achieve lower overall costs and a quicker field development programme. It seems increasingly likely, for example, that they can construct one 7,000 tonne structure a good deal more rapidly than the two or three smaller units it replaces. It should be possible, with staggered starts, to complete and commission two structures of 5,000 tonnes or more, in only a few weeks more than three 2,000 tonne modules.

Thus, experience so far seems to be validating original hopes. The larger structural sizes are producing the

expected overall benefits.

There are also savings in time and materials at more detailed levels. The amount of steel fabrication in the larger box, for example, is generally less than the total in the smaller structures. Moreover, the site team for a VLS will almost always be fewer than the total required for two or three earlier modules.

As know-how has accumulated, fabricators have found other ways of reducing costs. On big decks, the introduction of new construction methods will allow some disciplines to carry on working, while activities that might otherwise have hampered production, can also be undertaken.

The extent of onshore commissioning may be enlarged, perhaps even beyond original expectations. One fabricator is considering commissioning the drilling rig on one large deck by boring a hole through the assembly pad to simulate offshore conditions.

Many also believe that the big structures make it easier to accelerate construction programmes. Trades people can be supplemented at virtually any time to speed up operations. Having said that, it is conversely essential to monitor and control the delivery of plant and materials with precision. In terms of construction cost, the penalties for delays caused by late deliveries are that much higher.

No uncertainties

All in all, uncertainties and mysteries that may have surrounded the building of these new-generation structures have largely evaporated. VLSs can undoubtedly be constructed satisfactorily by conventional techniques and conventional equipment, the latter in some cases having to be uprated.

The increased weight does, however, have effects in other areas. To cope with higher conventional four support/weighing point reactions, some fabricators have strengthened their assembly aprons. This may not, however, always be necessary. As an alternative, the number of points designed into the structure can be increased to allow aprons to take the higher weights without raising the level of reaction significantly at any one point.

It has also become clear that one large structure absorbs much less yard space than its two or three alternatives. This arises not only from the smaller area needed for one structure but also (less obviously perhaps) from the reduced need for access routes. One fabricator has calculated that the saving in just this requirement has released about 30 percent more yard area.

Discoveries such as these — and they are only examples of many — underline the need for detailed research and planning by the fabricator in preparing to construct a VLS. While basic philosophies are much the same as before, they should now be subject to closer evaluation as construction advances. This had led to more use of computers in formulating and monitoring both the critical paths and numerous subcritical routes.

The care essential in quantifying, investigating and scheduling has created a situation in which client, designer and contractor work in closer harmony than ever before. To give one example, construction starts for a VLS may well be timed to allow the design to be checked for fitness for purpose. Close consultation between all parties is becoming the norm rather than an exception enforced by some crisis.

Constructability

In fact 'constructability' has become something of a *cause célèbre* in the industry. One consequence is that the designer finds himself working closely with the fabricator from the earliest stages of a project, to ensure the design can be constructed efficiently and economically. This has led to a better understanding of construction methods and disciplines and how they can be exploited to realise the advantages of the VLS concept. Operators have also come to appreciate this and some have included in contracts a 'preparation' period to allow for liaison between designer and fabricator. This approach is producing designs with less of the revision and late engineering information that can slow work so seriously and add heavily to costs.

More collaborative attitudes have, for example, led to designers ensuring full structural integrity of individual areas within the structural box. This enables outfitting to be carried out in a phased schedule during the primary construction process, producing valuable reductions in overall programme times. Similarly, more consideration is given nowadays at the initial design stage to supports and pipework attachments. The sheer scale of these elements on a VLS can cause problems in their own right if not anticipated on the drawing board.

Another example of how practical construction restraints can influence 'theoretical' design, is provided by the trend towards bigger plate girders. Heading towards depths over 2,000mm, these are acquiring relatively lighter webs as designers fight the weight penalty. In fact, the web can become so thin that it is vulnerable to localized distortion and deformation from welding heat. The problem can be eased by designing girders individually with their webs adjusted in depth and thickness along the length to meet the required loadings, bending moments and shear forces.

The increased loading weights in VLSs also necessitate a study of the cambering needed on girders to offset deflection under load.

Bearing-point support is another area of reconsideration from a construction viewpoint. If the popular four-point configuration is used on VLSs, clients may be faced with considerable costs in supporting steelwork (on apron and barge) and piling foundations. An additional £400,000 is not an unrealistic estimate for these 'extras' on a 7,000 tonne module. Eight-point support would save most, if not all, this expense.

There are many other considerations. Suffice it to say, that the VLS has created the opportunity for a collaboration that should see the end of those designs which came to grief in the fabricators' yards in the past.

Commissioning

Maximising onshore commissioning has always been seen as the key to reducing the cost of bringing modules into service. Until the VLS arrived, only some commissioning operations were carried out in the fabricators' yards. The balance of work was done, expensively and often slowly, offshore where the modules come together in hook-up. With a VLS that integrates the functions of several smaller modules nearly all commissioning can, in theory at least, be completed in the yard. It also follows that benefits will result from the load-out, transportation, lifting and hook-up of one, instead of several, units.

However, the need for more thoroughgoing commissioning in the yards does make further demands on both operators and fabricators. As a rule, the fabricator will divide the VLS module into systems, each of which is commissioned separately, where precommissioning in parallel is not feasible. Certain systems, lighting and small power, for example, are normally precommissioned during construction to allow efficient utilisation of resources during the main commissioning programme.

The provision of an adequate power supply can, of course, be a difficulty in commissioning large process modules. However, the cost advantages of onshore commissioning are such that it ought not to be allowed to become insuperable. Power generation units could be made specifically for this purpose. A power generation unit could be built into the VLS itself. This does necessitate some changes to design but it is a workable solution nonetheless.

Indeed, it is worth trying anything to maximise onshore commissioning.

Although it does mean that yards must have the capacity to accept a longer occupation of working space, the rewards to the client in overall reduction in the construction and commissioning costs are too valuable to be ignored. It is no exaggeration to claim that, given the will and equipment, a 5,000 tonne VLS could be constructed and commissioned in approximately 18 months.

Load-out problems

Earlier modules for the North Sea have tended to fall into the range of 2.5 to 3.0 tonnes/sq metre, as a function of the structural box plan area. A doubling of this loading range figure in the design of a new VLS does not present any overwhelming problems for proven methods and techniques.

However, serious increases above this level require the development of different procedures. These may include civil engineering and specialised equipment, with their attendant cost implications. Moreover, if the width of the VLS approaches that of its sea-going barge, another limiting design parameter enters the equation.

EPIC approach

Another factor that promises to influence the way North Sea structures are built is the emergence of the so-called EPIC scheme. One or two major fabricators are now offering these turnkey services, in which the contractor undertakes everything from detail design and procurement to fabrication, pre-commissioning, load-out and installation. Some also offer to carry out offshore hook-up and commissioning of the structure under the same scheme.

Its protagonists see the concept as a means of curbing the cost of field development by relieving clients of the expense and financial risk in managing projects in detail. In EPIC schemes, the fabricator is financially and operationally responsible for converting the design concept into ready-for-use reality to the specified quality, cost and time targets.

The integration of activities which are normally separate means that, while the client retains overall control, he needs a much smaller project team to monitor progress. Management of the contract becomes the responsibility of the fabricator.

The close coordination of design and construction should also result in useful savings and enhance the likelihood of an economically 'buildable' structure. By its very nature EPIC does, after all, allow full advantages to be taken at the earliest design stages of the fabricators' experience as a constructor.

This 'hands on' expertise should minimise the modifications that once had to be made to ensure that detail designs were compatible with fabrication processes. On one conventional contract, nearly 3,500 variations, some quite major, were necessary before the structure was completed.

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OIL SUPPLY AND PRICE

The Re-emergence of the Producers: OPEC and the Independents

The Annual IP Conference will be held on

TUESDAY 7 NOVEMBER 1989

Each November, a panel of distinguished experts come to London to discuss the latest outlook for world oil at The Institute of Petroleum. This year the speakers will come from New York, Moscow, Brussels, Calgary and Paris, as well as London. The Conference will be chaired by Silvan Robinson, Chairman of the Energy and Environmental Programme at the Royal Institute of International Affairs.

After the price collapse in 1986, world oil production remained relatively static in 1987. However, 1988 was a different story with world oil demand up by 4 percent and OPEC output over 20 million barrels per day for the first time since 1981.

Do these changes strengthen or weaken OPEC? What is the significance of the new developments in the Soviet Union? Will the spread of futures markets across the world and 24-hour trading improve or impair stability for producers? Are the 1990s going to see a different role for OPEC and the independents? How different will the new Single Market be for European energy? Where does the IEA see the demand curve for developing nations?

PROGRAMME

Morning Session

Keynote Address
Sir Peter Holmes, Chairman, Shell Transport and Trading Company plc

OPEC and the Middle East — An Energy Analyst's View
Mr Mehdi Varzi, Director, Kleinwort Grieveson Securities Ltd.

Spread of Futures Markets — Global Harmony or Regional Fragmentation?
Ms Rosemary McFadden

Problems for Consumer Nations in the 1990s
Mr Quincey Lumsden, Director of the Office of Oil Markets Development, International Energy Agency

Afternoon Session

European Energy Balances through and beyond 1992
Mr Clive Jones, Deputy Director General for Energy — European Commission

North America — An Oil Market Leader?
Mr Marcel Kramer, Senior Adviser for International Markets, Corporate Development, Petro-Canada Inc.

USSR — A Reappraisal of Energy and Export Values
Professor A A Arbatov, Vice-Chairman of the Committee for Productive Forces and Natural Resources, USSR Academy of Sciences

For a copy of the registration form, please contact **Caroline Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Telephone 01-636 1004. Telex: 264380. Fax: 01-255 1472.**

Publications

***Oil Economists Handbook*, Gilbert Jenkins** (Barking: Elsevier, 5th edition 1989) 864 pp, £165.

Now expanded into two companion volumes, this familiar reference book is of prime value to researchers, libraries and all newcomers anxious to learn the curious kremlinology of international oilspeak. It is also useful for a few senior executives crossing to new disciplines who always presumed to know what THAT meant but now really need to know. The glossary, chronology and directory from the second volume is for them. Pride of place for this reviewer goes to the statistical tables in volume one. As the introduction acknowledges, these tables originally grew out of the *BP Statistical Review* but their scope and timescale now extend much further.

***El petroleo en Espana (Petroleum in Spain): From Monopoly to Free Market*, Javier Santamaria,** (Madrid: Espasa-Calpe SA), 210 pp.

This book fills a vital gap in our knowledge of the Spanish petroleum market. It covers the developments since the death of Franco at the end of 1975 through Spain's accession in 1986 (with Portugal) as the latest member of the European Community, and the signing of the Single Europe Act in 1987, committing Spain to further measures of liberalisation before 1992. Javier Santamaria is Secretary General of Petromed. A law graduate of Valladolid and a MBA at Columbia, he has devoted many years to the energy development of his country and has written and lectured at many international gatherings, including the Institute of Petroleum. The text deals successively with the development of energy demand in Spain, the legal development of the monopoly, the current industrial structure of energy after 50 years of monopoly, the measures decided upon in order to join the EEC and the particular transitional problems caused by the Rome Treaty.

The text is in Spanish but the clarity of the style, full of historical facts, numerical and structural details, with over 50 tables, graphs and maps, makes its message clear to those with a little knowledge of Castilian and enhances its value as a reference source with the minimum of translation.

***Petroleum Resources and Development: Economic, Legal and Policy Issues for Developing Countries*, Kameel IF Khan (ed.),** (London & New York: Belhaven Press, 1988), 277 pp, £27.50.

Since the collapse of oil prices in 1986, the way in which developing countries cope with the legal, economic and policy implications of petroleum resource development has changed dramatically. The inter-relationships between energy policy, fiscal policy, legal and technical issues are undergoing rapid realignment.

Kameel Khan, a barrister-at-law, is a petroleum tax consultant and lecturer in law at the University of Reading. He has brought together 18 specialists in the petroleum field to deal with the various issues involved in adapting and then reintegrating petroleum development into a sound future for the national economy.

***Natural Gas in Europe: Markets, Organisation and Politics*, Javier Estrada, Helge Ole Bergesen, Arild Moe and Anne Kristin Sydnes (eds.)** (London and New York: Frances Pinter 1988), 289 pp, £35.

If the gas industry as an international entity is less well understood than oil, it is probably due to a relative scarcity of books with the breadth of approach going beyond the technical or national perspective. This book will help to fill the gap. The authors are from the Nansen Institute in Oslo. Here is no narrow view of Europe — it covers the complexities of the evolving European gas grid from the Urals to Algeria with equal attention to producers and consumers, together with projections for each beyond the year 2000. It looks especially at the transmission companies as they are obliged to take on a trans-national dimension.

Its conclusions on the likely future nature of the European gas market are qualified by the observation that 'the constellation of political and economic forces in a modern industrial society is never completely stable'. Whether this results in 'business as before' or a tendency to rapid change precisely sums up the dilemma facing European gas as it grows closer to, yet more distinct from, the problems of its sister industry.

European Energy Outlook to the Year 2010, (Paris: DRI Europe, June 1989), 420 pp, $3,400.

DRI Europe, already known for their European Energy Forecast Reports, have just issued this study which is updated every six months. Data Resources Inc is part of Standard & Poor's McGraw-Hill Massachusetts' publishing group which also includes Platts. In recent years DRI have built up European offices in Paris, London, Brussels, Milan and Frankfurt.

They have also just launched a monthly subscription magazine, European Oil Monitor, which analyses main developments in oil markets in Europe, with special attention to 1992 and the impact of environmental factors such as unleaded gasoline and the resultant pressures on refiners.

Model Questionnaire for Engineering Contractor Prequalification, Process Plant Contractors Group (London: Energy Industries Council, 1989), 30pp, £15.

A questionnaire designed to standardise the prequalification enquiries issued by operating companies to engineering contractors. Many of the enquiries are aimed at obtaining standard information from the contractor and the EIC hopes that the questionnaire will play a part in improving quality and efficiency of administration in the industry.

***Dynamics of Offshore Structures*, Minoo H Patel** (Guildford: Butterworths, 1989), 402pp, £57.50.

This is a useful textbook designed to present an integrated treatment of the design, construction and operation of offshore structures. Particular emphasis is placed on the fundamentals of oceanography, wave theory, hydrodynamics and naval architecture to meet the needs of students reading ocean engineering or naval architecture at undergraduate and postgraduate levels.

Scottish Petroleum Annual 1988/89 (Aberdeen: Aberdeen Petroleum Publishing, 1989), 132pp, £8.95.

This is an illustrated glossy which gives a comprehensive review of individual oil and gas fields in the UK and Norwegian sectors of the North Sea. There are also a number of topical review articles including an assessment of the first 25 years of North Sea oil and the performance of BP/Britoil. Some 30 pages of the book are devoted to Scotland's oil and gas facilities ranging from terminals to fabrication yards and the Scottish regions.

North Sea Oil and Gas Directory 1989/90 (London: **Judith Patten,** 1989), 1070pp, £48.

An A-Z directory of exploration and production companies, drilling contractors, project management contractors and manufacturers operating in the North Sea. The directory also contains an index to products, services, official organisations and events. There is a foreward by Peter Morrison, the Minister of State for Energy and a piece by George Band of UKOOA assessing 25 years of the UKCS.

Publications

Recent Department of Energy Offshore Technology Reports available from HMSO in London:

***Review of Fatigue in Concrete Marine Structures*, WIJ Price, EC Hambly and AH Tricklebank, EWH Gifford and Partners,** 106pp, £30.50.

***Fatigue Correlation Study: Semi-Submersible Platforms*, R Potthurst, AD Coates and R Nataraja, Lloyd's Register of Shipping,** 64pp, £27.50.

***Concrete in the Oceans Programme: Coordinating Report on the Whole Programme*, MB Leeming, UEG/CIRIA,** 225pp, £42.50.

***The Cathodic Protection of Steel in Real and Simulated Seawater Environments*, RFA Carney, AM Pritchard, NJM Wilkins and S Terry, Harwell Laboratory, Oxford,** 37pp, £12.75.

***Assessment of Fracture Mechanics Fatigue Predictions of T-Butt Welded Connections with Complex Stress Fields*, JK Sharples, AM Clayton and DJ Lacey, UKAEA,** 75pp, £13.75.

***Gasoline and Diesel Fuel Additives*, K Owen (ed)** (Chichester: John Wiley for the Society of Chemical Industry, 1989), 174pp, £42.50.

This book deals with a subject that has become increasingly important. Over the past ten years, lead alkyls have been phased out of gasoline which now contains more cracked components than in the past. Oxygenated components which are now used to compensate for the loss of lead alkyls, cause a number of difficulties which can be overcome by the use of appropriate additives.

Other developments include the pressure on manufacturers to improve exhaust gas quality and fuel economy and the wish for product differentiation by the oil companies.

The book is a reference work which is likely to interest those involved in fuel additive manufacturing and marketing as well as automotive engineers.

***Trends in Motor Vehicle Emission and Fuel Consumption Regulations — 1989 Update*, CONCAWE** (The Hague: CONCAWE, 1989), 86pp.

The latest in a series of annual updates recording changes in national and international laws relating to motor vehicle emissions, fuel specifications and fuel consumption.

The scope of the report covers Europe, the US and Canada as well as Australia, Japan, Singapore, South Korea, Brazil and Mexico.

The Environmental Handbook (Northampton: Taylor Marketing, 1989), 400pp, £58.

The first environmental yearbook to be published which acts as a directory of associations, institutions and national and local government bodies concerned with the environment.

The first section of the book has 70 categories and is a comprehensive directory of the many organisations concerned with environmental matters. The second section lists major personnel concerned with the environment in Britain's county, borough and district councils as well as chief executives of all health authorities. The foreward to this first edition is written by Virginia Bottomley, Parliamentary Under-Secretary of State in the Department of the Environment.

***Thermal Methods of Petroleum Production*, NK Baibakov and AR Garushev** (Amsterdam: Elsevier, 1989), 210pp, $105.25.

Until now, information on Soviet enhanced oil recovery (EOR) research work and field experience has not been available in English. This work, originally published in Russian, describes recent Soviet laboratory and field research as well as the industrial experience of applying thermal EOR methods to different Soviet oil fields.

***Illustrated Glossary of Petroleum Geochemistry*, Jennifer A Miles** (Oxford: Clarendon Press, 1989), 137pp, £17.50.

This glossary provides easy access to basic geochemical terminology so that geoscientists and managers in the petroleum industry can interpret readily geochemical literature.

The first part of the book provides a summary in the form of tables and diagrams. The main part gives self-contained explanations of the most common terms used. Numerous illustrations are included, as are references for future reading.

***Drilling Wastes*, FR Engelhardt, JP Ray, AH Gillam (eds)** (Amsterdam: Elsevier, 1989), 867pp, £95.

This volume contains papers presented at the 1988 International Conference on Drilling Wastes which dealt with the treatment, control and environmental fate and effects of drilling wastes resulting from petroleum exploration and development.

The conference was the first to be held on the broad evaluation of this subject since 1980 and the proceedings present a thorough evaluation of recent advances in technology in the area. Both land-based and off-shore drilling operations are discussed as well as oil-based and conventional water-based drilling muds. The publication is valuable in that it presents new data from world environmental studies and provides an up-to-date integrated overview of the topic.

***Financial Survey Company Directory*, ICC Financial Surveys** (Hampton: ICC, 1979), 120pp, £195.

This is the latest edition of ICC's Oil and Petroleum Producers survey and covers 610 quoted and unquoted companies involved in the sector. It is an extremely easy-to-use reference work, containing financial and company data from the last three years accounts that are publicly available.

Turnover, pre-tax profits, current assets, current liabilities, return on capital employed and profit margin are all included, making comparative analyses easy. Company details and a geographical index are also included.

***World Energy Outlook — Through 2000*, Conoco,** 1989.

This provides a useful complement to the *BP Statistical Review of World Energy*, re-issued in July. It gives one major company's annual review of future world energy trends to add to another's review of past and present. The Conoco forecasts do not cover the Soviet Bloc and China, while about half the coverage goes to the United States, which is projected to be importing 11 million b/d by the end of the century. One wonders what this will do to prices and the value of the dollar.

Euro Energy Information

Better access to dynamic information

In order to improve the dissemination of information on energy a large number of relevant European Organisations have joined together to form **Euro Energy Information**.

The principal objectives are:

— to develop a better **understanding of each other**

— **to provide a grouping of competent** European organisations representing EEC countries as well as Switzerland, Austria, Scandinavia and Iceland.

— to provide a **vehicle for common interchange and thought**

— to be **recognised source of information** on Energy for Europe.

The initial activities are:

— the creation of an authoritative directory covering each of the organisations involved

— the presentation of projects and proposals from the group to the EEC particularly to DG XVII, DG XIII, DG XI

— the selection of four subject areas to be examined
i.e. **numeric databases,**
energy use and the environment,
renewables and energy conservation,
prices and taxes.

For information: F. BRENIERE
Institut Français de l'Energie
Euro Energy Information Secretary
Tel: (331) 4524 4614
Telex: 615 867 IFENERG
Telecopy: (331) 4050 0754

Escape system

The Selantic escape system, developed in Norway by Selantic Industrier A/S, is an innovation in providing a safe, effective and controlled method of emergency evacuation from high-rise structures in either an offshore or onshore environment.

The escape system comprises Skyscape, a patented transportation idea which renders unnecessary the use of helicopters and lifeboats.

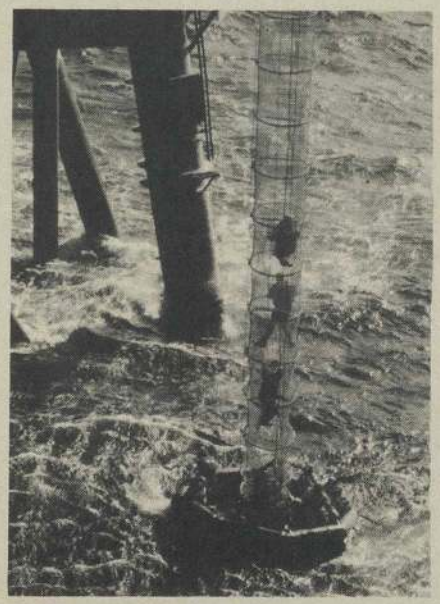
Skyscape is a continuous tubular 'sock' made from a strong and fireproof fibre. Inside the vertical tube, a series of staggered ledges make up a speed-breaking chute. The outside shape is maintained by steel hoops placed at intervals of just over 1 metre. The design provides a zigzag lattice of slides throughout the entire length of the system allowing for controlled evacuation.

Openings located behind the slide in each cell allow for controlled entry or exit of the chute at any level simultaneously. A specially designed stretcher is available for evacuating injured personnel.

At the end of the chute is an integral collection point raft and a satellite network of fully enclosed life rafts, also deployed with the chute, allowing for movement away from the area.

When not in use, Skyscape requires under 5cms of storage height for every metre of system length.

Skyscape has been tested offshore in the North Sea by the Norwegian state oil company, Statoil for a period of 17 hours in wind speeds of 63 knots and wave heights of 11 metres. They concluded that Skyscape was an excellent evacuation system even in severe weather conditions.



The Skyscape 'sock' in action.

Shutdown equipment

Proven capability in the supply of emergency shutdown equipment for the power generation, offshore oil and gas and onshore petrochemical process industries is highlighted in a new 'Shutdown Systems' brochure issued by Protech Instruments of Luton, a Rotork control and instrumentation company.

Protech designs and manufactures a wide range of plug-in units that combine to provide high integrity shutdown systems for plant protection. Examples of applications are given in the brochure.

The Protech Eurocard design offers a good balance between single loop integrity and high packing density. This ensures maximum plant protection in a lightweight solution that makes minimum demands on space – all vital benefits to the offshore industry. (Photograph courtesy of Conoco (U.K.) Limited.)

Offshore data

A new system for the high speed transfer of data over radio in offshore operations has been announced by Communications & Measurement Technologies Ltd, UK.

Called RADACS MTS 458 it transfers data at four times the speed of existing radio modem links. It comprises the RLC 200-HS high speed radio data link controller, a newly developed 0.5 Watt telemetry band transceiver and a power supply.

The RADACS MTS 458 has a wide range of offshore applications including: the transfer of data from tide gauges and current meters to shore data collection and processing centres; vessel-to-vessel communications; data links for line-of-sight positioning systems including differential GPS applications; control between drilling unit and vessel in vertical seismic profiling operations; and communication between construction barges and their support vessels.

Explosion-proof

A range of explosion-proof equipment designed to meet the stringent requirements of the offshore and petrochemical industries, as well as water treatment applications, is available from R Stahl Ltd.

Backed by over 60 years' experience in explosion protection, R Stahl manufactures and supplies its unique range of equipment direct from its facilities in the UK and Germany.

The company's wide range of explosion-proof hoists, with lifting capacities of between 250kg and 50,000kg, includes electric chain hoists, electric wire rope hoists, electric belt hoists and open winches. All hoists made by Stahl are supplied ready for connection to a power source, can be supplied with two hoisting speeds, and are designed for stationary applications or for use with various types of travel carriages.

Stahl also manufactures explosion-proof components and lighting equipment as well as installation material, process measurement, indication devices, electronic components control and regulating equipment.

All products are backed by a comprehensive service providing maintenance, repairs, spare parts, modifications and accessories.

Because the company produces all the components used in its products, it guarantees that the equipment meets the stringent standards relating to explosion-proof equipment operating in hazardous environments. Indeed, R Stahl is the only company offering full certification on all its equipment.

Novel design

Systems and consulting engineers, YARD, has played an important role in a novel design feature, scheduled to be implemented by Shell Expro, operating in the UK North Sea on behalf of the Shell/Esso joint venture in the Kittiwake field.

The proposed platform will demonstrate a major departure from general practice, with the electric motor driven fire pumps being supplied from mains power supply, rather than from the traditional diesel generators.

To safeguard these supplies, three separate main generators, each feeding its own HV switchboard, with each generator and switchboard segregated in separate A60 enclosures were proposed. Each switchboard provides supplies to one of the 100 percent duty submersible electric pumps contained in caissons.

Recycling permeable separation

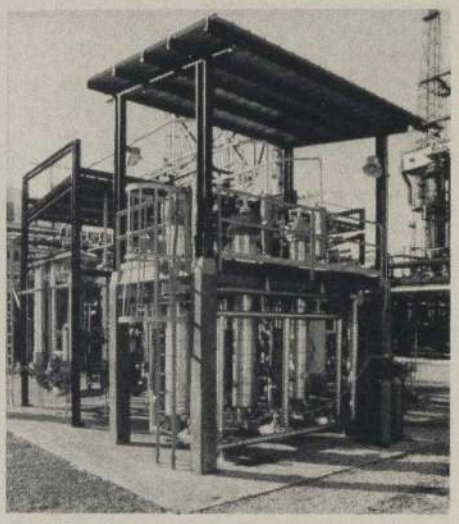
Developed jointly by French concern Air Liquide and Du Pont, Medal is a separation system for hydrogenated gas streams based on the principle of selective permeation.

Some gases — termed 'fast' — are more permeable than others and will readily pass through a membrane to leave a residue of 'slow' gases.

Medal units are equipped with millions of hollow fibres laid perpendicular to the gas stream. These fibres have extremely fine polyaramide walls which allow highly permeable hydrogen atoms to pass through them, down the hollow interior of the fibre and away into the reclaimed stream. Less permeable gases — methane, for example — flow around the fibres and into the residue stream.

The Medal System can process a variety of feed mixtures. It can drive low-concentration feeds of 20 percent hydrogen up to 80 per cent purity while achieving recoveries of over 75 percent. Higher purity streams of 75 percent hydrogen can be enriched to 95 percent while achieving 90 percent recovery rates.

The equipment was designed to meet the requirements of refineries and petrochemical plants for the recovery and recycling of hydrogen, to purge gases in various synthesis loops, for CO/H2 synthesis gas ratio adjustment, and improvement of HDS processing units.



The Medal separation system.

The unit needs little operator attention or maintenance, and has an expected life of five to 10 years. Operating experience at a Conoco refinery in the US has shown the system to be versatile, reliable and rugged.

Octel gasoline quality survey

Octel's latest worldwide survey of motor gasoline quality covers octane number, lead content and estimated consumption of motor gasoline in 178 countries and illustrates changes in gasoline consumption and quality in 1988.

As in 1987 an overall growth in gasoline consumption was evident during the year. Within Europe most countries have announced their intentions to reduce lead in gasoline levels to 0.15 grammes per litre. The availability of unleaded gasolines became more widespread, but the growth of consumption remained small in countries where there were no tax incentives to promote its use.

The overall effects of changes in lead maxima, the increased use of un-leaded and high octane levels are placing increasing demands on refinery process capacity. Due to the shortage of pool octane numbers, components such as MTBE are now commanding prices which previously would have been considered unrealistically high.

Kent to develop laser meter

The University of Kent has been awarded a contract to develop a gas flow meter based on the latest laser/optical fibre technology, to measure the flow of gas from North Sea fields.

The contract is a major step forward in the application of laser/optical fibre measurement techniques common in research and development facilities but never before used in the offshore oil and gas industry. If it is successful, it will lead to a range of commercial applications of the technique in other industries where the precise measurement of gas flows is necessary.

The contract, worth £164,000 over three years, has been placed by Shell UK Exploration and Production, which produces about one-third of the UK's gas, as the operator in the North Sea for Shell and Esso. It has gone to Kent Scientific and Industrial Projects Limited, a subsidiary formed by the university for the commercial application of its research and transfer of technology.

UOP detoxification

UOP has introduced new technology for the detoxification of liquid organic hazardous and toxic wastes. As a refinement of traditionally practiced hydroprocessing technology, the UOP approach selectively separates and/or converts the heteroatom contaminants such as halogens, sulfur, nitrogen, oxygen and organic metals from the waste hydrocarbon matrix.

Although waste materials vary significantly from industry to industry, the technology is readily adaptable to a wide variety of liquid wastes.

UOP's new technology offers to industry an environmentally sound alternative to incineration and other thermal oxidative processes.

Ventilation

Genflo Underwater Engineering, Aberdeen, have introduced the Airflo ventilator to assist the passage of air within tanks or confined areas in oil installations and platforms.

The Airflo acts as a fan, magnifying the airflow by 50 to 1. It is intrinsically safe having no moving parts, nor requiring electrical power: it operates from a small amount of compressed air.

Airflo provides a steady feed of air into confined spaces, or can be ducted from one part of an installation to another. It can be tipped to direct the air vertically as well as horizontally, such as within the leg of an oil platform. Duct mountings are available for tank ventilation.

World's deepest J-tube

McDermott Marine Construction has completed the laying of a 12-inch pipeline in waters up to 1,350 feet for Shell Offshore Inc.

The pipeline was started at the Bullwinkle platform in Green Canyon Block 65 where it was pulled through a 24-inch J-tube, the deepest pull on record. From Bullwinkle, the 7.5-mile line was layed to the Boxer platform in Green Canyon Block 19 where a subsea tie-in was made.

Offshore loudspeakers

A 10 watt loudspeaker and 50 watt high power line array for oil and gas platform use are available from Vitavox. Originally designed for the maritime defence industry, they are watertight, corrosion resistant, vibration and blast proof.

IFEG RMS

Joint meeting in Aberdeen on Managing Offshore Industry Information

21 September 1989

The Information for Energy Group and The Records Management Society are holding a seminar on developments in the field of information and records management relating to the Offshore Industry. The meeting will be held in Aberdeen on the afternoon of 21 September 1989.

Presentations by two speakers:

Mike Boyle,
Records Information Management, Shell UK Exploration
and
Alison North,
Records Management Consultant
will be followed by discussion.

For further information please contact:
Arnold Myers,
Institute of Offshore Engineering.
Tel: (031) 449 3393.

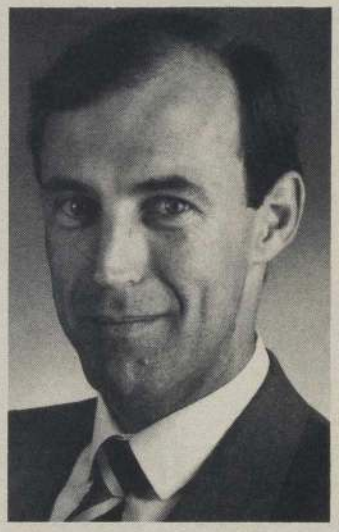
Dr Harold Hughes, above, has been appointed Director-General of UKOOA with effect from 1 January 1990, in succession to George Band. He joins UKOOA on 1 September as Director-General Designate. Dr Hughes was, until earlier this year, Director and General Manager, Exploration Companies for British Gas. He is also a fellow of the Institute of Petroleum.

UKOOA represents 33 oil and gas companies which are designated operators of licences on the UK Continental Shelf. It performs a wide range of technical and administrative functions and represents the industry in its dealings with government and other organisations.

Mr Stephen M Solomon, above, has been appointed President of Lummus Crest Inc which is a subsidiary of Combustion Engineering Inc., an international engineering and construction company providing a range of technologies and services to the chemical, petrochemical, petroleum refining, oil and gas, and pulp and paper industries.

Mr Richard Fenny has returned to London as Vice President, Marketing, for Fluor Daniel.

Texaco Limited has created a Safety and Environmental Affairs Department to be headed by **Mr Brian Goodland,** who is a vice president of the Institute of Petroleum. The department will assume overall corporate co-ordinating responsibilities for implementing safety, environmental protection, industrial hygiene and occupational health policies for Texaco in the United Kingdom. It will provide advice and technical support for all Texaco's departments on all matters related to plant, product and personnel safety, and where the environment is affected by operations.



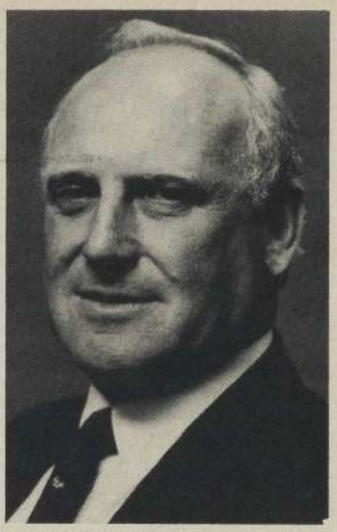
Dr David Curry, above, currently Programme Leader Drilling Mechanics at the Schlumberger Cambridge Research centre (SCR) has been appointed Managing Director of the International Drilling and Downhole Technology Centre in Aberdeen.

Clyde Petroleum Ltd have appointed **Mr Paul Zatz** as Finance Director, **Mr Andrew Windham** will succeed him as Company Secretary and **Mr Stanley Rendall,** Managing Director of Clyde Petroleum (Netherlands) B.V., will retire as an Executive Director at the end of December.

Mr Ken Ross has been appointed president of Rush Johnson Associates, the offshore loss adjusters, appraisers and surveyors who are wholly owned by The Salvage Association.

Captain Jostein Kvaloy, above, has been appointed Operations Manager with Stavanger-based Westminster Seaway, offshore contractors specialising in the covering and stabilisation of marine pipelines and other underwater structures.

WASK-RMF, a leading manufacturer of distribution fittings and ancillary equipment for the gas, water and petrochemical industries, has strengthened its sales force with the appointment of 3 new area technical sales managers — **Mr Sandy Maxwell,** above left, technical sales manager for Scotland, **Mr Ian Perkins,** above middle, technical sales manager for the South East and **Mr Ray Sturdy,** above right, technical sales manager for the Midlands and South West.



Mr MG Wille, above, has been appointed Managing Director of Phillips Petroleum Products Limited. He also becomes Vice President, Petroleum Products Marketing, Phillips Petroleum Company Europe-Africa. In both positions he succeeds JA Taylor who is to take early retirement after 25 years' service with the company.

Aberdeen-based North Star Shipping Ltd., who operate one of the biggest standby fleets in the North Sea, have appointed **Mr Robin Smith** as director of the company. His responsibilities include the maintenance and operation of North Star's 33 standby vessels and associated ship-repairing facilities.

Mr Gerry Cowan, above, has been promoted to the newly-created position of General Manager for the lubricant specialist, Alexander Duckham and Co Ltd. He had been Planning and Marketing Director since 1985.

Mr W Grant Cochrane has rejoined the LASMO plc Board of Directors in a non-executive capacity. Mr Cochrane was previously a Board member between 1972 and 1982.

1990 IP Diary

The improved IP Diary, with the Institute of Petroleum's crest and the date reproduced as above in gold at the top of the leather cover, gives ample space for embossing of own logos. It will be available in the late Autumn.

The colour of the cover will be green.

There will be 32 pages of specially printed copy, including oil industry statistics collected by the Institute of Petroleum.

Orders can be taken now for the 1990 IP Diary, the cost for a single diary being £5.50 (incl. p&p and VAT); £7.00 overseas.

Discounts are available for bulk orders on application. Embossing of company logos is available at extra charge. Enquiries and orders should be made to:

Jackie Little,
Institute of Petroleum,
61 New Cavendish Street, London W1M 8AR,
Telephone: 01 636 1004, Fax: 01 225 1472,
Telex: 264380

Please reserve for me ..... copies of the 1990 IP Diary

I enclose my cheque for: £ ..... made payable to
The Institute of Petroleum

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The Institute of Petroleum

CONFERENCES AND COURSES 1989–1990

1989

October 4	Rapid Methods for Diagnosis of Microbial Problems in the Petroleum Industry
October 11	Modern Practice in Handling Aviation Fuel at Airports
October 25	Trends in World Natural Gas Trade
November 7	Oil Supply and Price
November 16	Cost Reduction Offshore — The Way Ahead
November 22	Automotive and Industrial Fuel Combustion — Environmental and Health Implications
November 29	Standards of Competency*

1990

February 20	Oil Price Information
February 21	Annual Dinner
March 20	Energy Information for 1992
April 4	Diesel Fuel
April 25	Microbiological Risk Assessments for COSHH
June 27, 28, 29	Introduction to Oil Industry Operations Course
July 2, 3, 4	Introduction to Petroleum Economics Course
September 26, 27, 28	Oil Industry Nurses Symposium

For further information, please contact:

Caroline Little

The Institute of Petroleum
61 New Cavendish Street
London W1M 8AR, UK

Telephone: 01-636 1004
Telex: 264380
Fax: 01-255 1472

*Please contact Mr A E Lodge at The Institute of Petroleum

Technical Report

Marketing and Refining

The Tank Cleaning Safety Code, Part 16 of the IP Model Code of Safe Practice was published at the beginning of August. This covers the cleaning of bulk oil storage tanks.

The Institute is undertaking a Road Tank Wagon loading procedures survey to ensure the maintenance of common safety procedures between companies.

The Marketing and Safety Sub Committees are extending the Institute's product identification system to provide appropriate marking for premium (98 octane) unleaded petrol.

A meeting has been held with the HSE Hazardous Installations and Transportation, National Industries Group (HITNIG) to confirm the effectiveness of the Oil industry philosophy with respect to maintenance and inspection of road tankers. It is hoped that this meeting will help overcome the problem of variations in local interpretation by HSE officials.

A proposal to develop a compatibility standard for in-cab computers is being worked on.

The Aviation Liaison Committee work has resulted in the witnessing of manufacturers filter tests in USA, the undertaking of leak detection investigations at sites worldwide, and initiating excess flow tests on hydrant pit valves in Holland. Also comments have resulted in changes on API standards for hoses and hydrant pit components.

An updated version of the Area Classification Code modified by comments received from Institute members has been forwarded to the HSE and Department of Energy prior to preparation of the work for the publishers.

The Institute has been asked by the UK Petroleum Industry Association to produce a guidance note on the safe practices to be observed in handling heavy fuel oil which may contain a hazardous level of hydrogen sulphide. A first draft is in preparation.

Standardization and Measurement

Work on the Petroleum Measurement Manual continued with Part XVI Section 2 the Guide for Cargo Surveyors — products being sold in August. Future codes will be published in ISO format to speed up the introduction of IP codes (via BSI) as ISO standards.

A meeting has been arranged between Heriot Watt University and oil company representatives to examine the technical aspects of a report on Service Stations Losses produced for the Petroleum Retailers Association.

Occupational Health

A Memorandum of Agreement has been signed by the Institute and Thames Polytechnic for an update of the Rushton-Alderson epidemiology study of refinery and oil distribution workers. Work has started with publication of the refinery study report estimated for the third quarter 1990 and the distribution study report by the first quarter 1991.

An agreement has also been reached with Dr Grasso for a watching brief on behalf of the Institute of new papers published on the possible carcinogenicity of automotive emissions.

Exploration and Production

A Task Group has been set up to supervise the work on the Code of Practice for high pressure Well Control and contracts are about to be exchanged with Department of Energy. Desk research is in hand with contributions from operating companies, hose manufacturers etc, but the essential prerequisite of 'worst case scenario' information from the UKOOA study is not yet available.

After delays due to pressure of work a group has been set up, with support from the UKOOA safety committee, to produce a code of practice for handling drilling muds, following on the report received by the Advisory Committee on Health.

Arrangements are being made for holding jointly with the Institution of Mechanical Engineers an important conference on Offshore Safety during late 1990 in London.

Environment

The Institute has been involved as a member of the Watt Committee engaged in the study of the Greenhouse gases and options available to the UK to reduce the effects. Members of the committee include representatives from all major British energy industries and organisations in West Germany, Spain and France.

Staff Changes

Due to the impending retirement of Mr PD O'Connell currently looking after Measurement matters, and the resignation of Mr T Baker who has been handling Standardization matters, the Institute has been involved in recruitment activities. We welcome Mr JM Wood who will replace Mr O'Connell and Mr JHR Phipps who will replace Mr Baker.

A E H Williams, Director General

The Institute of Petroleum Microbiology Committee

RAPID METHODS FOR DIAGNOSIS OF MICROBIAL PROBLEMS IN THE PETROLEUM INDUSTRY

Wednesday 4 October 1989

A One-Day Conference to be held at The Institute of Petroleum

This conference reviews the developments which have occurred in rapid quantitative and diagnostic microbiology and their relevance to the petroleum industry. There are barriers to such instant technology transfer and an added requirement for the critical evaluation of results.
Not all rapid methods are machine-based and expensive. Cheap 'on-site' test kits have proliferated and are relevant but the user may again need help in interpreting his results.
Rapid methods are in a constantly changing scene and this symposium will be the first opportunity to appraise it critically from an industry standpoint. What's in it for us?

PROGRAMME

Morning Session

Chairman: Mr EC Hill, Managing Director, ECHA Microbiology Ltd., and Chairman, The Institute of Petroleum Microbiology Committee

Review of Rapid Techniques
Dr RJ Watkinson, Senior Scientist, Shell Biosciences Laboratory

Radiorespirometry — Its Uses in the Laboratory and Field for the Determination of SRB
Dr D Holt and Dr M Mosley, SGS Micran Ltd

Electronic Microbial Monitoring
Dr Ann Swain, Cranfield Biotechnology Ltd

Microbiological Analysis using Electrical Impedance Measurements
Dr G Hobbs, Director, Torry Research Station

Afternoon Session

Potential Applications for ATP Bioluminescence in Oil Microbiology
Dr S Fenton, Sonco Ltd

Fluorescent Techniques for Detecting Micro-organisms
Mr R Swannell, University of Essex

Bioluminescence Technologies
Mr R Smither, Microbial Assays Group, Amersham International plc

For a copy of the registration form, please contact **Caroline Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Telephone: 01-636 1004. Telex: 264380. Fax: 01-255 1472.**

Polytechnic freedom: What's in it for managers?

By Peter Bowen, Managing Director, Management Performance Ltd

1989 was the year that the polytechnics gained their new corporate status and became responsible for their own futures. By this time most polytechnics were accredited by the Council for National Academic Awards to design and review their own degree programmes. These are substantial changes. For the first time each institution can sell its wares and take its chances as it thinks fit. This is good news for employers and for all friends of higher education in the non-university sector.

Why?

One reason is that this sector of higher education is now the largest in the United Kingdom. There are over 220,000 students registered on first degree and post-graduate courses of study in the polytechnics and the colleges. One in four of the under-graduate programmes are 'sandwich' degrees – programmes which require one year's supervised placement in work. Polytechnics specialise in work-related learning, and employers value it. As the polytechnics compete for business, we can expect rapid developments in the kind of arrangements for flexible learning which employers prefer.

Here are my five suggestions for getting the best value out of this new chain of independent providers:

1. Graduates

Everybody says that graduates will be thin on the ground in the 1990s. Shrewd employers will devote more resources and more ingenuity to attracting their share of the talent from a smaller pool. Start to use the CNAA database, and run regular checks on what's new in the polytechnics and colleges. The speed of new course starts is impressive. Think about recruiting graduates from a much wider range of subjects and about the recruitment of graduate equivalents as substitutes. Get to know the polytechnic careers guidance people even better.

2. Graduates in first management appointments

The transition from college-based management education to work-related management learning continues apace. The Management Charter Initiative and the movement towards competence-led management training has already influenced employers to concentrate on management skills in today's job as much as the development of potential in tomorrow's. Look out for the new Certificate in Management which will be on offer in many business schools in 1990. This is the new manager on first appointment programme developed with funds from the Training Agency, and awaiting final approval by the CNAA.

In approach, the new Certificate is aimed at bringing young managers up to speed quickly.

3. Accrediting in-company training

How the Certificate in Management is organised will depend on the interests of the polytechnic which offers it but also on the resources of the employer. For example, it will be possible for an employer to offer existing training material and existing training courses within the organisation as credit towards, or exemption against the requirements of the certificate. It means that not all managers will need to complete all stages of the certificate programme. This will be determined by personal audit or by a skills assessment check which indicates what the manager needs to learn and how.

Accrediting in-company training in this way removes finally, the gulf between management training and management education. Look out for polytechnics, offering an accreditation service of this kind. Look out for the polytechnics which will encourage employers to develop their own training resources for use in the new certificate and diploma programmes.

4. Polytechnic partnerships

Employers who believe in the value of the continuous development of managers will build on-going links with polytechnics. They can use the polytechnics as an accrediting agency where qualifications are sound incentives to retain staff. They will work with polytechnics to establish accredited courses which will be run by in-company trainers or by faculty from the polytechnic, or by both.

The in-company qualification is now much nearer. Many employers still regard the 'open MBA' completed externally in a business school as the only sure way of achieving a good MBA. Increasingly, however, other employers will see the progression to MBA as a routine pathway for the above average manager. The point is that above average managers are increasing as a proportion of the whole, and above average managers want an MBA!

5. Towards the learning organisation

Why should employers invest in the continuous development of their people? Some say that the model work organisation of the 1990s is the 'learning organisation.' This is an organisation where the quality of work depends on the capabilities of people to learn from each other. It is a fascinating concept and one which employers could do well to explore.

The idea is that organisations improve themselves by creating learning networks within. These networks are cells of managers who meet regularly to identify problems and find cost-effective solutions.

Action learning programmes of this kind will parallel flexible learning programmes offered by polytechnics and other business schools.

What's in store for the polytechnics? New opportunities to work with employers in learning partnerships which help many managers to achieve competence in the knowledge and skills of the job. What's in store for employers? Exciting ideas to develop customised, flexible learning programmes for all their managers.

Teacher secondment into industry

By AJ Riddell, Assistant Rector, Banchory Academy, near Aberdeen

As an assistant head teacher, it has been part of my remit for some time to develop links between the school and industry with the aim of strengthening the curriculum and enhancing pupils' experience. When the chance came to be seconded to BP in Dyce on a venture jointly funded by Grampian Regional Council and BP, I saw an opportunity to broaden my own experience after over 20 years in teaching.

I began my secondment in August 1988, based in the Training Centre, with a fairly wide and flexible job description which allowed me to develop the secondment in my own way. While I enjoyed this freedom, I would have welcomed a greater involvement by my Education Authority which stands to gain from my experiences.

My principal role was to stimulate activity in the field of Education/Industry liaison in the 13 schools in the region which are associated with BP through the Link Scheme. I encouraged schools to submit proposals to the BP School/Industry Challenge Scheme and as a result BP, with the assistance of other companies identified by the schools, was able to support a number of curricular and staff development initiatives, involving teachers from a wide range of subjects. My secondment was for a year but several other teachers have spent shorter periods (two or three weeks) working on specific projects to enrich the curriculum in their schools — the use of computers in industry, technological studies, office and information studies.

I had considerable involvement in the Craft Trainee Technician recruitment programme which meant talking to careers staff and pupils in schools as well as being part of an interview team which saw around 700 boys and girls in three months. My presence had obvious benefits to the company but it also gave me an insight into how a major company recruits school leavers. I was impressed as a teacher to see the importance placed on the personal qualities of the candidates rather than their academic qualifications alone.

During the year I worked to ensure that the company and its employees are better informed of the changes in education as they affect industry, particularly the new examination structure and new subjects which have entered the curriculum.

One major criticism of industry, and BP cannot be exempt, is that commitment to educational liaison at the top is not always transmitted to middle management and below, so that the importance to the company of successful co-operation is sometimes not given full attention. A means of transmitting this commitment should be explored as a matter of urgency.

Another criticism is the old one that too few people from industry ever go into a school to find out what happens there. To say there is no time is to ignore the importance of a good educational system to industry. If industrialists cannot find the time to go into schools with helpful criticism and support, then industry cannot complain if schools do not produce what industry thinks it wants.

I have had a very full and exciting year which has done a great deal for my own personal development. There will be benefits to the pupils I teach and ultimately benefits to industry in general through the availability of a more industrially aware group of school leavers not just in my own school but in all the schools which have been involved in Links with BP and other companies in the region.

An encouraging and very positive step is that BP and Grampian Region have agreed to a senior teacher replacement for my position as part of a rolling secondment.

Alyson Turton and Arthur Dacre (second from right) were joint winners of an Institute of Petroleum Student Prize for their outstanding performances on the MSc course in Offshore Engineering at Robert Gordon's Institute of Technology in the 1988/89 academic year.

The prizes were presented by Kevin Fleming, Branch Vice-Chairman (extreme right) at a recent meeting of the Aberdeen Branch when Bill Cochrane, Chevron (UK) Ltd., (centre) was the speaker. Also present was Jim Kelman (extreme left), Course Leader, RGIT.

Central Training Register

At the request of the Council of UKOOA, the Offshore Petroleum Industry Training Board set up a Central Training Register (CTR) to help tackle the problem of verification of offshore fire and survival training course certificates. The UK Department of Energy has agreed that Well Control Certification records should also be entered in the register which started up on 1 July 1989.

Further details of the CTR and the courses that will initially qualify for central registration may be obtained from Mr Michael Cummins, OPITB, Forties Road, Angus, Scotland DD10 9ET.

Diary Dates

Workshop on Standards of Competency at the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR on 29 November 1989. Details from Alan Lodge at the Institute of Petroleum.

Flexible Training Conference and Exhibition at the Novotel Exhibition Centre, London from 28 to 30 November 1989. Details from Blenheim Queensdale Ltd., 137 Blenheim Crescent, London W11 2EQ.

THE INSTITUTE OF PETROLEUM

Petroleum Measurement Manual
Part XV Metering Systems Section 2
A Guide to Gas Metering Systems

This section of the Petroleum Measurement Manual covers the specification, design, installation and operation of metering stations for high accuracy measurement of the bulk flow of gases in pipelines. The types of metering equipment described are intended for the measurement of natural hydrocarbon gases for the purposes of sales, custody transfer, taxation or the allocation of production in a multi-user pipeline.

Contents: Definitions and Symbols: Quantitative and Qualitative Measurements • Measurement Conditions • Flow Measurement • Uncertainty and Accuracy • Symbols • **Applications – General Requirements** • Basic Design Considerations • Gas Acceptability Criteria • Performance and Calibration • Choice of Primary Device • Mass, Volume and Density Measurement • Service Considerations • **System Design** • Design Criteria • Piping Configurations and Valving • Secondary Instrumentation • Safety • **Orifice Meters** • General Principles • Flow Equations • Meter Design • Installation • **Other Meters** • Turbine Meters • Displacement Meters • Vortex Meters • Ultrasonic Meters • Sonic Nozzles • Some Other Meters • **Calibration and Proving** • General • Off-Site Calibration • Service Proving • Tracer Methods • **Secondary Instrumentation** • Differential Pressure Transmitters (DPTs) • Temperature Measurement • Pressure Measurement • Density Measurement • Continuous Measurement of Density • The pTZ Method • Measurement of Relative Density • Installation of Line Density Meters • Redundancy in Density Measurement • **Equipment for Composition and Quality Measurement** • Gas Sampling • Measurement of Composition • Measurement of Calorific Value • Measurement of Wobbe Index • Measurement of Hydrocarbon Dewpoint • Measurement of Water Dewpoint • Measurement of Contaminants • **Flow Computation and Display** • Flow Computers • Calculation of Gas Quantities • Calculation of Gas Properties • Simple Flow Computers • **Commissioning and Maintenance** • Testing and Commissioning • Commissioning • Inspection and Maintenance.

Series: Institute of Petroleum Petroleum Measurement Manual
0471917567 approx 48pp due October 1989 approx £39.00/$83.00
Published on Behalf of the Institute of Petroleum, London, UK

Part XVI Petroleum Measurement Manual
Procedures for Oil Cargo Measurements by Cargo Surveyors
Section 2 – Petroleum Products

The accuracy of measurement of a given quantity of oil is dependant on test and calculation methods used. In the past reliability of the quantities certfied by cargo surveyors has inevitably varied and subsequently been a frequent cause of frustration, legal proceedings and additional costs. It is now generally recognised that the oil industry would benefit from the use of commonly accepted measurement and accounting procedures when oil cargos are being surveyed. Consequently these procedures have taken the form of Section 1 – Crude Oil (published in 1987) and this present Section 2 – Petroleum Products.

Contents: Scope • Definitions • General Principles • Safety Requirements • Operation Planning (Loading and Discharge) • Measurement and Sampling Procedures • Procedures to Control Product Quality • Measurement Procedures at Loading • Measurement Procedures at Discharge • Final Report • References to Test and Calculation Methods.

Series: Institute of Petroleum Petroleum Measurement Manual
0471924628 approx 56pp due August 1989 approx £35.00/$72.45
Published on Behalf of the Institute of Petroleum, London, UK

Methods for Assessing and Reducing Injury from Chemical Accidents
SCOPE 40

Edited by **P. Bourdeau**, Commission of the European Communities, Brussels,
and **G. Green**, School of Hygiene and Public Health, The John Hopkin University, Baltimore, USA

0471922781 328pp June 1989 £51.00/$97.95

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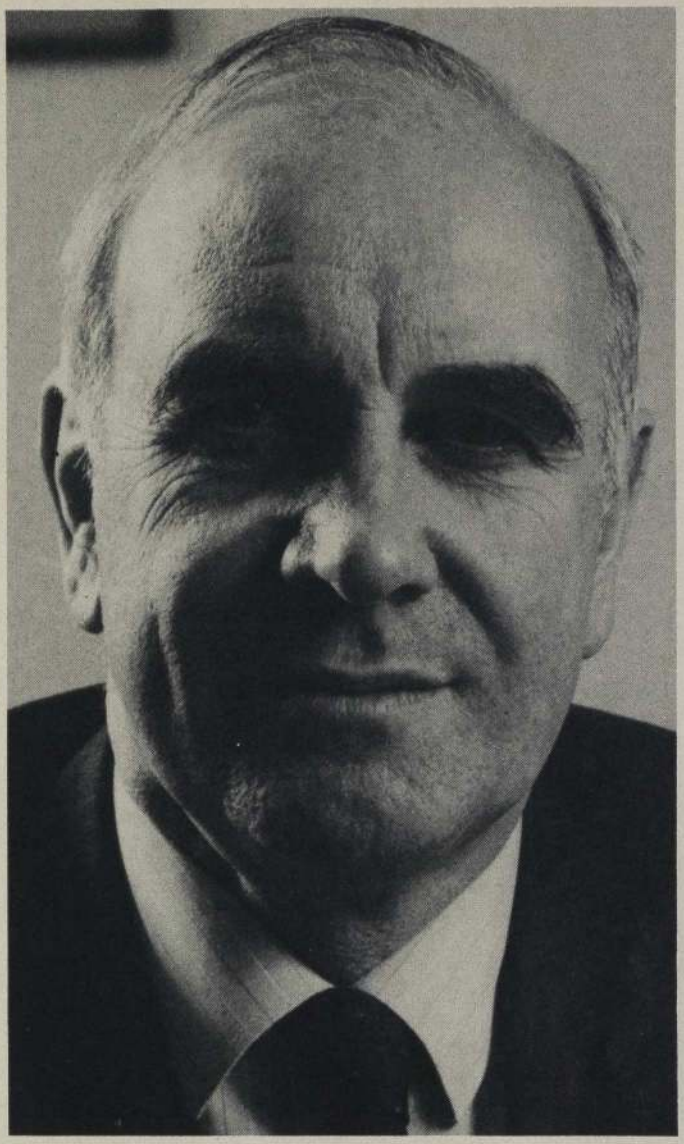
IP Council appoints President-Elect



The Institute of Petroleum Council has appointed Basil Butler, a Managing Director of the British Petroleum Company plc., as President-Elect of the Institute with the express intention of his being nominated for election as President at the Annual General Meeting on 12 June 1990. (At the IP Annual General Meeting on 13 June 1989, Council was authorised to appoint a President-Elect for the current session.)

Basil Butler has been a Managing Director of The British Petroleum Company plc since 1986. He is Chairman of BP Research and BP Ventures and is also on the boards of BP America, BP Chemicals, BP Australia and BP New Zealand and has responsibility for Australasia, Near East, Middle East and Indian subcontinent, Health Safety and Environment, Research, Ventures and BP Engineering.

Born in March 1930, Mr Butler served in the British Army. He joined Trinidad Leaseholds as a petroleum engineer working in the West Indies after graduating from Cambridge University. In 1958 he joined the Kuwait Oil Company and worked as a production engineer, reservoir engineer and petroleum engineer, becoming Chief Petroleum Engineer.

In 1968 Mr Butler joined BP Colombia Inc., as Operations Manager in Bogota. In 1970 he went to Alaska with BP to carry out studies on drilling and completing wells in permafrost, later becoming Operations Manager and General Manager, BP Alaska Inc.

He returned to Kuwait Oil Company as General Manager of Operations in 1972. In 1975 he returned to the UK and was engaged in the construction of the Ninian pipeline.

Subsequently, he was in charge of the development of the Sullom Voe Terminal in the Shetland Islands and was a Director of the Sullom Voe Association. In March 1978 he was appointed General Manager, Exploration and Production, BP Petroleum Development Limited in Aberdeen, and a Director the following month. He became Chief Executive of BP Petroleum Development Limited in February 1980, based in London. Mr Butler was appointed General Manager, Exploration and Production Department in September 1980.

In January 1981 he was appointed Director, BP Trading with responsibilities for exploration and production, and took up the position of Director of BP International Limited and Managing Director and Chief Executive of BP Exploration in March 1981. He was Chairman of BP Exploration Limited from 1986 to May 1989.

Mr Butler is married with one son and two daughters and lives in Buckinghamshire. He is a fellow of the Institute of Mining Metallurgy and the Institute of Petroleum and was elected to the Fellowship of Engineering in 1985. He was awarded the OBE in the 1976 New Year's Honours List.

When proposing Mr Butler's election to the IP Council in August, Sir Archibald Forster noted that his background was upstream, which would help the Institute in developing that side of its activities but his recent and current activities were much broader and included many of the downstream areas, with which the IP had been traditionally involved.

New Collective Member

Stena Offshore Ltd is a wholly owned subsidiary of the Stena AB Group, supporting the worldwide activities of a multi-purpose fleet of specialist offshore support vessels.

In 1986 the company increased the scope of its activities from the provision of marine hardware and management only to the provision of a in-house range of services, including subsea well completion on a 'turnkey' basis, drilling, heavy and light workover on subsea wells, diving support, ROV and survey, hyperbaric welding, subsea IRM, engineering construction, marine management, floating production systems and marine pipeline construction.

The company has bases in Aberdeen, Great Yarmouth, Oslo, Australia, Singapore, Rio de Janeiro and Bombay.

MASS FLOWMETERING SEMINAR

14 December 1989

The Institute is sponsoring this conference on Coriolis mass flowmetering. Members of the Institute of Petroleum are entitled to reduced registration fees and should enquire about this when registering direct with the organisers — Conference Office, Sira Ltd, South Hill, Chislehurst, Kent BR7 5EH.

Around the Branches

Aberdeen

Secretary: Mr PM Johnson, Manager, Public Affairs, BP Exploration, Farburn Industrial Estate, Aberdeen AB2 0PB. Tel: 0224 832024.

Unless otherwise stated, meetings will be held at Treetops Hotel, 161 Springfield Road, Aberdeen, at 18.30 hours.

1989

10 Oct: 'Ivanhoe/Rob Roy Field Development', by Paul Collins, Amerada Hess Limited.

14 Nov: 'Offshore Licensing — A Complex Issue!', by Ian Gray, Exploration Conoco (UK) Limited.

12 Dec: 'Policing the North Sea', by Chief Inspector Ian Gordon, Grampian Police.

1990

9 Jan: 'Oil Based Mud and the Environment', by Chris Meyjes, MGA Consultancy Services.

13 Feb: Annual General Meeting, Shell Offshore Control Centre, Aberdeen.

13 Mar: 'Controlling North Sea Air Traffic', by Eric Melvin, Air Traffic Control, Aberdeen.

3 Apr: 'K-Lab, Tomorrow's Gas Metering Today?', Dr Paul Wilcox, Total Oil Marine Plc.

15 May: 'Good Media Image! But Could it be improved?', Jack Regan, Editor News & Current Affairs Radio, Scotland.

Edinburgh & South-east Scotland

Secretary: Mr D Low, Technical Dept, BP Chemicals Ltd, Grangemouth, Stirlingshire. Tel: 032 44 83411.

Meetings will be held in the Royal Scot Hotel, Glasgow Road, Edinburgh unless otherwise stated.

1989

12 Oct: 'Total Quality', by T Rielly, BP Chemicals. Venue: BP Oil Refinery Cinema.

2 Nov: 'Tunnelling' by RN Craig, Technical Director of the Channel Tunnel.

7 Dec: 'Water Losses — Detection, Control and Economic Consequences', by W Smith, Water Industry Training Association.

1990

18 Jan: 'Environmental Aspects of the Wytch Farm Development', speaker to be confirmed.

15 Feb: 'The Escort Project', by R Sargent, PA Consultants.

15 Mar: Spouses' Evening: 'Natural History and Conservation in the Forth Valley', Miss N Gordon, The Nature Conservancy Council.

Essex

Secretary: Mr AL Carson, 471 Kents Hill Road North, Benfleet, Essex SS7 4AD.

All meetings will be held in the Pegasus Club, Herd Lane, Corringham at 5.30 p.m. unless otherwise stated.

1989

11 Oct: 'Quality Assurance and BS 5750', Dr ER Wright, Esso Petroleum Co. Ltd.

8 Nov: Ladies Evening 'Garden Topics', Mr N Fisher, Tomlins Nurseries Ltd.

1990

10 Jan: 'Transportation of Dangerous Substances from a Police Viewpoint', Sgt. Bottrill, Essex County Constabulary.

14 Feb: Annual General Meeting followed by 'Operation of the Harbour Master and Thames Navigation Service', Capt J Fisher.

14 Mar: 'Road Tanker and Loading Racks Safety Systems', Mr JD Snook, Esso Petroleum Co Ltd.

Humber

Secretary: Mr G Stratford, LES Engineering Ltd, Armstrong Street, West Marsh Industrial Estate, Grimsby, South Humberside DN3 1XD. Tel: 0472 353516.

All meetings will be held at the Humber Royal Hotel, Grimsby, unless otherwise stated, and will begin at 1930 hours.

1989

5 Oct: 'Major Hazard Assessment', Dr RP Pape, Head of H.S.E. Major Hazard Assessment Unit.

27 Oct: Annual Dinner Dance. Venue: Beachcomer, Humberston.

23 Nov: 'Petrofina Pipeline Project', speaker to be announced.

1990

18 Jan: '1992', speaker to be announced.

8 Feb: Annual General Meeting.

2 Mar: Annual Dinner. Venue: Beachcomer, Humberston.

29 Mar: 'Eurotunnel', P Marten, Eurotunnel Consortium.

19 Apr: Ladies Night. Venue: Beachcomer, Humberston.

16 May: 'Killingholme Power Generation Project' speaker to be announced. Joint meeting with the Grimsby Institute of Engineers and Shipbuilders. Venue: Winter Gardens, Cleethorpes.

Irish

Secretary: Mr JTN Tierney, Irish Shell Ltd, Shell House, Lower Hatch Street, Dublin 2. Tel: 0001 613633.

1989

8 Sept: Golf Outing.

mid Sept: 'SWOPS' visit to Belfast (Date and details to be confirmed).

London

Secretary: Mrs E Walker, Conoco Ltd, Conoco House, 230 Blackfriar Road, London SE1 8NR. Tel: 01 408 6215.

Meetings will be held at the IP, 61 New Cavendish Street, London W1 at 1800 hours unless otherwise stated.

1989

20 Sept: 'Air Pollution — Who is the Guilty Party', G McInnes, Warren Spring Laboratory.

19 Oct: 'Passenger Car Engine – Oil Development', M Wharton, Esso Research Centre Abingdon.

9 Nov: 'Small Field Developments of the Future', JP Shute, Enterprise Oil. Venue: Room 131, The Royal School of Mines, Prince Consort Road, London SW7.

1990

17 Jan: 'Coal and the Environment', JS Harrison, Coal Research Establishment.

20 Feb: 'Unleaded Gasoline – The Future', N Pattison, Shell UK Oil.

14 Mar: 'The Changing Role of the Independent Oil Company', A Cluff, Cluff Oil Resources plc. The meeting will be preceded by the Annual General Meeting at the IP.

6 Apr: Annual Dinner/Dance 18.45 for 19.15 hours, Elizabeth Suite, Barrington House, Gresham Street, London E2.

18 Apr: 'Is Subsea Blow-out a Risk to Floating Structures', Dr T Moros, BP Research Centre.

23 May: 'Helicopter Operations in the North Sea', Capt M Norris, Bristow Helicopters.

Midlands

Secretary: Mr DJ Margaroni, Joseph Batson & Co Ltd, Dudley Road, Tipton, West Midlands DY4 8EH. Tel: 021 557 2284.

All presentations are to be held in the Department of Chemical Engineering Lecture Theatre, University of Birmingham at 6 p.m.

1989

18 Oct: 'Synthetic Lubricants', A Robertson, ICI.

15 Nov: 'The Influence of Unleaded Petrol and of the Forthcoming Exhaust Emission Regulations on Engine Design', speaker to be announced.

13 Dec: Social Evening (details to be arranged).

1990

17 Jan: 'The Influence of Unleaded Petrol and of the Forthcoming Exhaust Emission Regulations on Engine Lubricant Design', J Hillier, BP.

19 Jan: IP/BLF Dinner Dance, Park Hall Hotel, Wolverhampton.

14 Feb: Film Night, Annual General Meeting and Supper.

14 Mar: 'Fire Control', speaker to be announced.

25 Apr: 'The Petroleum Chemical Industry', speaker to be announced.

Northern

Secretary: Mrs E Gillatt, 53 The Woodlands, Lostock, Bolton, Lancashire BL6 4JD. Tel: 0204 434290.

All presentations to be held at Belfrey Hotel, Handforth at 6.30 p.m. unless otherwise stated.

1989
28 Sept: Golf Day at Dunham, Altrincham.
17 Oct: 'Future Trends in the Oil Industry'. Speaker to be announced.
14: Nov: 'White Oils' by Dr Lees, Maff.
24: Nov: Annual Dinner Dance 7.00 for 7.30 p.m.

1990
16 Jan: 'Gear Oils', speaker to be announced.
13 Feb: Annual General Meeting followed by talk on 'Hydraulic Oils', by M Holder, Edgar Vaughan UK Ltd.
9 Apr: Annual Hot Pot Supper/Sportsman's Evening, to be announced.

Shetland

Secretary: Mr PN Guy, BP Petroleum Development Limited, Sullom Voe Terminal, Mossbank, Shetland ZE2 9TU. Tel: 0806 243437.

1989
10 Nov: Annual Dinner, Shetland Hotel.

1990
8 Feb: Annual General Meeting, Shetland Hotel.

Southern

Secretary: Mr M Ball, Esso Petroleum Company Ltd, Esso Refinery, Fawley, Southampton SO4 1TX. Tel: 0703 896021.

1989
9 Sept: Treasure Hunt (to be confirmed).

South Wales

Secretary: Mr IJ Thomas, BP Oil Llandarcy Refinery Ltd, Neath, West Glamorgan SA10 6HJ. Tel: Skewen 813232.
All presentations will be held at BP Oil Llandarcy Refinery unless otherwise stated.
21 Sept: 'Unleaded Gasoline', M Denham, BP Research Sunbury.
19 Oct: 'Weather Prediction', D Langley, Cardiff Weather Centre. Venue: Amoco Refinery, Milford.
23 Nov: 'The Beckingham Experiment and Application', K Floyd, BP Exploration.

1990
16 Jan: 'Project Management', LA Taft, Inco Europe.
25 Jan: 'The Impact of Environmental legislation on European Refinery Economics' PA Hunt, Chem Systems International Ltd. Venue: Stradey Park Hotel, Llanelli.
22 Feb: Annual General Meeting & Holiday 90', Thomas Cook Group Ltd. Venue: Stradey Park Hotel, Llanelli.
22 Mar: 'Wind Energy – The Carmarthen Bay Project', WL Birch, CEGB. Venue: University College, Swansea.
26 Apr: 'A Fire Service for the Future', R Oldacres, Dyfed County Fire Brigade. Venue: Texaco Refinery, Pembroke.

Stanlow Branch

Secretary: Mr J Hargis, Shell UK Ltd, PO Box 3, Stanlow, Cheshire L65 4HB. Tel: 051 355 3600.

1989
28 Sept: Works visit to Chester Central Post Office.
18 Oct: 'Channel Tunnel Transportation System', P Martens, Euro Tunnel Plc. Venue: Shell Thornton Research Centre.
17 Nov: Dinner and Dance, Queen Hotel, Chester.
Dec: 'The Impact of Electricity Privatisation on Industry', speaker to be confirmed. Venue: Shell Refinery Training Centre.

1990
24 Jan: Annual General Meeting followed by 'The Shell HYCON Process', J Naber, Shell International Petroleum. Venue: Shell Thornton Research Centre.
Feb: 'European Automotive Catalysts', R Searles, Johnson Matthey Plc. Venue: Hoole Hall, Chester.
Mar: Joint meeting with Northern Branch, speaker and topic to be announced. Swan Hotel, Buckley.
9 May: 'The Environment and the Oil Industry', speakers to be announced. Venue: Shell Thornton Research Centre.

West of Scotland
Secretary: Mr A Lowson, BP Exploration, 301 St Vincent Street, Glasgow G2 5DD. Tel: 041 225 4937.
Meetings will be held in the Hospitality Inn, 36 Cambridge Street, Glasgow unless stated.

1989
7 Sept: Branch Golf Tournament. Venue: Old Ranfurly Golf Club, Bridge of Weir.
24 Oct: 'Celebrity Lecture', LM Urquhart LLB, CA, Group Chief Executive, Burmah Oil Plc. Venue: Strathclyde University.
23 Nov: Dinner and lecture.
7 Dec: Lunchtime lecture 'The Marketing of a New Crude', C Robertson. Venue: BP Exploration auditorium.

1990
8 Feb: Annual General Meeting and lecture 'English and Scottish Law', Professor Jack. Venue: BP Exploration auditorium.
8: Mar: Petroleum Dinner.

Yorkshire

Secretary: Mr P Osler, Osler Fuels Ltd, Battye Street, Bradford BD4 8AG. Tel: 0274 663521.
All meetings will be held at the Mansion Hotel, Roundhay, Leeds, unless otherwise stated.

1989
12 Sept: Ladies Night: 'Tour of Ripley Castle, Harrogate.
10 Oct: 'Compressor Lubricants' D Cassidy, CIBA-Geigy.
14 Nov: 'The Place of the Independent Distributor in Today's Market', P. Kidd, Chairman, Fuel Distributor Holdings.
2 Dec: 'Bottom Loading' E Gillespie, Maidment Tanker Services Ltd.

1990
9 Jan: 'Introducing BS 5750 into Lubrication', B Squires, Total Oil (GB) Ltd.
13 Feb: Annual General Meeting/Hot Pot Supper and Guest Speaker.
13 Mar: Joint Meeting with the Institute of Energy – 'Energy Management', RD Tinson, Chairman, Emstar.
23 Mar: Annual Dinner Dance.
13 Jun: Annual Golf Match.

ECONOMICS OF REFINING
Proceedings of a Conference held on 12 April 1989

The papers presented at this conference review the current and estimated forward European refining and market trends including the effects of product imports, and the very considerable costs borne by the refining industry to comply with environmental legislation concerning processes as well as products. The latest developments in computer techniques to optimise refinery profitability in rapidly varying market situations are also addressed.

The conference includes first-time descriptions of two specific examples of major European investment decisions to reduce heavy fuel oil make — Esso's Residfiner at Fawley and Shell's Hycon process at Pernis. The alternative indirect route for heavy oil conversion offered by the Institut Français du Pétrole is also presented.

Price: UK: £26.00. Overseas: £29.00.

OPTIMISING THE RETAIL NETWORK
Proceedings of a Conference held on 1 June 1989

In the present competitive conditions a major management priority is to optimise the return on the large investment most companies make in the retail network. This has involved not only the identification, acquisition and development of new outlets but also the optimisation of the existing network by redevelopment, competitive marketing strategies and the development of additional sources of income on the forecourt.

The papers given at the conference in June 1989 present a number of interesting insights into the ways in which various oil companies of differing sizes and attitudes approach the problem of optimising their retail networks and into the ways in which a number of companies engaged in property development, construction and training believe that their particular expertise has a role to play in helping their oil company clients achieve this.

Price: UK: £15.00 Oversees: £18.00

Please send remittance with order.

These publications are available from The Library, The Institute of Petroleum.

New Members

Blake, NJR, Hollybank, Rectory Road, Wood Norton, Foulsham, Norfolk.
Collomb, GR, Triton Energy Corporation, 87 Jermyn Street, London SW1 6JD.
Eng, J, Tullon Oil plc, 30 Fitzwilliam Place, Dublin 2, Ireland.
Gray, BJ, 3 Esk Cottages, Esk Lane, Invergordon, Ross-Shire IV18 0AS.
Kibble, MC, BK Technology Ltd, Unit 10 Stratfield Park, Waterlooville, Hants PO7 7XN.
Lloyd Jones, I, 11 Southcroft, Old Marston, Oxford OX3 0PF.
Longworth, EN, Executive Director, James R Knowles, 74 Great King Street, Edinburgh EH3 6QU.
Ridgewell, BJ, Castrol Ltd, Burmah House, Pipers Way, Swindon, Wiltshire SN3 1RE.
Rogers, D, 8 Blakedown Road, Linslade, Leighton Buzzard, Bedfordshire LU7 7XJ.
Sanders, PJ, Fluid Transfer Ltd, Nailsworth Mills Estate, Nailsworth, Gloucestershire GL6 0BT.
Seaton, PT, Petrofina (UK) Ltd, Petrofina House, Ashley Avenue, Epsom, Surrey KT18 5AO.
Strupinski, T, Frost plc, Sunley House, Oxford Road, Aylesbury, Bucks HP19 3RP.
Van Horne, EK, Mobil Oil Corporation, 150 East 42nd Street, Room 11E1001, New York USA, NY 10017.

Student Prize Winners

Feenan, JP, 41 Park Road, Chiswick, London W4 3EY.
McCarthy, F, Killowen House, Carrigaline Middle, Carrigaline, Co Cork, Ireland.

Student

Al-Samaan, Y, 7 Roseangle, Ground Right, Dundee DD1 4LP.

Deaths

We report with much regret the deaths of the following members:
ERD Barrett, Brampton, Sussex; born 1916.
NRG Carter, Leicester; born 1944.
TE Gaulton, Llandegla, Clwyd; born 1926.

Have you moved?

If so, please don't forget to notify the Institute of your change of address.

Deliveries into Consumption

UK deliveries into inland consumption of major petroleum products — Tonnes

Products	*June 1988*	*June 1989**	*Jan–June 1988†*	*Jan–June 1989**	*% change*
Naphtha/LDF	306,670	262,370	1,647,520	1,624,380	− 1.4
ATF—Kerosine	566,690	613,350	2,867,050	3,051,040	+ 6.4
Motor Spirit	1,984,450	2,050,020	11,317,020	11,771,390	+ 4.0
of which unleaded	15,190	422,300	43,860	1,467,680	+3,246.3
Burning Oil	97,870	77,200	992,560	982,680	− 1.0
Derv Fuel	798,010	857,410	4,572,110	4,954,540	+ 8.4
Gas/Diesel Oil	566,160	568,740	4,331,840	4,351,750	+ 0.5
Fuel Oil	866,270	574,390	5,419,190	4,970,880	− 8.3
Lubricating Oil	80,260	81,130	435,140	447,720	+ 2.9
Other Products	638,400	576,910	3,516,010	3,280,520	− 6.7
Total above	5,904,780	5,661,520	35,098,440	35,434,900	+ 1.0
Refinery Consumption	450,440	469,650	2,757,050	2,883,650	+ 4.6
Total all products	6,355,220	6,131,170	37,855,490	38,318,550	+ 1.2

* Preliminary † Revised