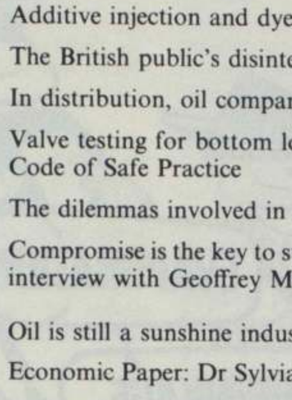
petroleum review

Vol. 42 No. 500 September 1988 £3.75
Subscription £33.00 inland £46.00 overseas

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 which was found in Jurassic strata similar in age to important oil-bearing formations in the North Sea.



Cover: Walter Carlyle was photographed at BP Grangemouth Refinery, of which he is General Manager, in the final stages of the rebuilding of the hydrocraker — a £45m revamp which will substantially increase the production of high octane components for the manufacture of unleaded petrol. It is due onstream again this winter. Photo by John Rae. Article page 4.

EDITORIAL

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Petroleum Review
is published monthly by
The Institute of Petroleum
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London W1M 8AR
telephone 01-636 1004 telex 264380

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Printed by
Eyre & Spottiswoode Ltd,
London and Margate.

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

ISSN 0020-3076

Headlines

5 July

Report says Costa Rica could have up to 500m barrels of oil in its subsoil along Pacific coast. National refiner, RECOPE, says Texaco Inc. sending team to negotiate on exploration prog.

Caltex Australia fined A$32m by govt for failing to meet commitment to regulated petrol market.

Report says Egypt concluded two oil and gas production-sharing pacts with Britoil and Unocal Corp.

7 July

Occidental Petroleum's Piper Alpha rig 'a raging inferno' after huge blast.

Oil and gas production stop following explosion on Shell/Esso Brent Alpha platform in North Sea.

Three year drilling prog starts on Australia's NW Shelf gas project consortium developing the Shelf is building A$3.7bn LNG plant to ship supplies to Japan late 1989.

Texaco Canada buys nine Alberta petroleum properties from Canterra Energy, adding 7.5m barrels of liquids and 19bn cu ft of natural gas to its proven reserves.

OPEC General Secretary considers calling emergency meeting of cartel to discuss current oil price collapse.

International Energy Agency says oil consumption by OECD countries could rise by 2–2.5%.

8 July

Following Piper Alpha disaster, Occidental declares Force Majeure on sales of crude from Flotta terminal in the Orkneys, Texaco prepares to issue precautionary Force Majeure to British Gas following explosion.

Texaco Inc. discovers crude oil offshore north west Angola, discovery flowed at average rate of 2,880b/d.

Phillips Petroleum acquires 95% interest in two Pakistani exploration tracts.

11 July

Shell says it may have to abandon North Sea operations if legislation introduced which demands massive expenditure on new installations as result of Piper Alpha disaster.

Gas supply agreement covering output from five fields in UK sector of North Sea signed by group of oil cos and buyer British Gas.

Italian Industry Minister presents national energy plan aimed at reducing country's dependence of foreign energy sources by turn of century.

First development drilling in Qatar's massive offshore natural gas field due to begin in August.

12 July

Mobil-Shell joint venture company finds oil and gas in Upper Austria.

Occidental announces plans to help finance a £25m offshore drilling project near Israeli coast.

Singapore's oil futures market expects to start operations next year with initial trading in fuel oil contracts.

13 July

Shell UK announces £3m sponsorship deal to boost image of British film and TV over next three years.

Department of Energy's ability to monitor UK North Sea field safety with own full-time inspectors hampered by high vacancy rate.

New study says a programme requiring more efficient energy use in USA could reduce oil imports by 15% over next 12 years and 25% long-term.

Shell survey says USSR by far world's largest oil producer, followed by America and Saudi Arabia.

14 July

Petrobas, announces offshore oil find with potential 10,000b/d, Brazilian President says country will be self-sufficient in oil within few years.

Peugeot Chairman launches crusade against plans to reduce exhaust emissions from small cars in the EC.

15 July

Trade union leaders say many N Sea oil rigs would be shut down if they were subjected to safety standards that apply on mainland.

Survey says major US oil companies' expenditure for oil exploration and production will rise this year by 12%, to $13.99bn.

18 July

All-party committee of MPs recommend Monopoly Commission investigation of UK oil companies' alleged price fixing.

Safety factors to be given higher rating in the awarding of N Sea exploration licences following Piper disaster.

Bolivian govt grants Occidental 30-year exploration and production concession in Northern Bolivia.

The Canadian govt to help finance the development of 500m barrels Hibernia oil field off coast of Newfoundland.

Pertamina oil company signs 10-year production sharing contract with Madura Shell BV for crude exploration and production in East Java.

16 July

Under conditions attached to 11th round of offshore exploration licences, UK government requires oil companies to surrender unexplored territory quicker.

Producers of Australian Gippsland crude cut output by 40,000b/d because of glutted crude market.

New Zealand government told new tax changes a significant deterrent to oil exploration.

21 July

All new cars in Britain will have to be capable of using unleaded petrol by October 1990 if draft regulations just published are adopted.

Shell suspends oil production at Nangnual field in Gulf of Thailand until 1990 at earliest because of water seepage.

American Gas Association says US consumption of natural gas will rise by 6% this year.

22 July

Survey says four-fifths of UK schools want more help from business, work experience placements tops list of demands.

Norway's annual oil production continues to grow, despite last year's announcement of a 7.5% cut in production target.

25 July

British motorists throwing away £2m a week by not switching to unleaded petrol says UKPIA.

Enterprise Oil upgrades its oil and gas reserves to 620m by doubling its stake in the Beryl Field and revising the size of its Nelson field.

Zeebrugge to be landfall for Norway's second major gas export pipeline to Continental Europe, construction of the $2.2bn Zeepipe begins shortly.

Amoco India signs contract to explore for oil off India's eastern coast.

BP is mid-way through a £10m prog to drill the deepest offshore well it has ever attempted, work is going on in the Porcupine Basin, 250 miles West of Ireland, in 3,000ft of water which could contain one of world's big undiscovered oil fields.

26 July

Shell withdraws plastic road tanks as 'precautionary measure' after two explosions.

BP considers legal action against contractors who built Sullom Voe terminal, where corrosion of pipes has demanded lengthy and costly repairs.

27 July

Oil production in Gabon set to rise 45% next year when onshore Rabi-Kaunga field adds 800,000b/d initially to country's current production levels.

In a £1.35bn deal, USSR agrees to supply Greek cities with natural gas.

European Commission says Spain will end its oil monopoly by 1991. Spain agrees to immediately abandon exclusive wholesale rights for fuel and heating oil and LPG.

OPEC's share of world oil production forecast to increase in years to 1992.

28 July

Limited production could restart next month from Shell's Brent Alpha platform.

Petrobas begins oil production for first time in the Amazonian region, initial production at the Urucu field is 3,000b/d.

The Trinidad and Tobago govt awards its first offshore oil exploration and production licences since 1981.

29 July

Shell's Superdrive subsidiary pays £62m for 50 Auto Safety Centres throughout Britain.

Chevron Canada to begin offshore exploration in Canadian Arctic this year.

LASMO signs agreement with the govt of Guyana giving it the right to explore in offshore waters.

1 August

Corrosion in pipes on North Sea oil platforms accelerated as gas and oil reserves diminish, says Robert Gordon Institute.

Japanese govt says it will keep a close watch on the entry of foreign capital into Japan's oil refining and marketing business.

2 August

Scottish Development Agency unveils scheme to locate £8.7m drilling technology centre for the oil industry in Aberdeen.

Danish consortium, DUC, is to spend $223m in new exploration and field development in the North Sea.

Lords Select Committee calls for ban on ozone pollutants.

Shell and BP press ahead with schemes to produce petrol and diesel from natural gas within 10 years.

3 August

BP NZ buys New Zealand's largest independent petrol retailing chain, Top Group.

4 August

Euro Commission worried about the surprise decision by the French govt to withdraw its support for plans to halve small car exhaust emissions.

OPEC admits its overproduction is one of the causes of low oil prices.

Unleaded petrol: the refiners act in advance of the market

Geoffrey Mayhew reports

The ability of the UK oil refining industry to produce unleaded petrol is rising sharply—far in excess of demand. The investment in refining plant in the UK to produce the costly components to make unleaded petrol through new or modified plant for the UK's 10 refineries has been at least £500 million, the bill for BP's rebuilding at Grangemouth Refinery alone being in excess of £40m.

Before the end of 1988, the rehabilitated hydrocracker at BP Grangemouth will be on stream again. Its ability to feed large volumes of high quality feedstock to the refinery's reformer will increase the UK oil industry's capacity to supply unleaded petrol by 0.3 million tonnes a year.

As a result, the UK industry will be able to produce, if required, a volume of unleaded petrol equal to 30 per cent of all the petrol consumed. However, the current demand amounts to only a little over one per cent.

But it would be wrong to say that an over capacity in unleaded petrol manufacturing exists — in the way that an over capacity in total refining exists in Western Europe.

The unleaded investment is a development that had to take place to satisfy the law and ecological requirements — and if a refinery wished to stay in the forefront of European refining.

Nor would it be correct to say that refiners are downhearted in the wake of the expenditure. Disappointed, yes. However, vast sums had to be spent because of the work and the high technology involved. But by the mid-1990s the demand will have risen substantially, and estimates for extra unleaded refining capacity at that time are already being contemplated.

Refiners also have to be prepared for a leap in demand, as has happened on the continent. The majority of car engines can take unleaded petrol now even though their owners do not bother. Education campaigns are taking place. They appear to have little effect. But all at once they might.

Quite apart from the Chancellor's promises of a further tax differential, the evidence for their eventual optimism is all around: the motorway jams, the third car families, the rising number of cars and drivers, an affluent society that wants to be mobile.

In the case of BP Grangemouth's hydrocracker, the increasing market for aviation kerosene was also a factor in the rebuild. The components it produces will also help to make more jet kerosene.

A number of companies chose to take the grass roots route when investing in new plant to produce the higher quality components needed for unleaded petrol manufacture. BP had three major upgrading units, a hydrocracker, cat cracker and a reformer. One of the advantages was that improved distillate components could be made in the hydrocracker without increasing the throughput of crude oil. The kerosene ability was also important.

The rebuild included the replacement of the four reactors within the hydrocracker, two of which treat the feed, the others carrying out the cracking reaction. Each replacement was a major undertaking on its own and under normal circumstances would not have been made for at least another two to three years.

Another factor was supply. The Grangemouth refinery is at the end of two pipelines. Most of its supply comes from the North Sea via the line from the Forties Field. It is also fed as occasion demands from a pipeline across the Lowlands from Finnart on Loch Long, on the West coast of Scotland. Unleaded petrol at Grangemouth will be made equally well from light oil from the North Sea or the heavier imported crudes which can reach it from the West.

The rebuilding, now nearly complete, has been on the 'fast track'. It is due to be completed within 18 months, in the course of which there was a six stage safety review conducted by independent teams. Every safety procedure has been critically re-examined and re-issued.

There will be more tax concessions for the unleaded motorist. In some countries a differential gasoline tax has been implemented, to favour the use of unleaded fuel, as shown in the Table below.

In Switzerland, Austria, Sweden, Norway and Denmark unleaded gasoline has replaced the leaded regular grade. In Switzerland, Sweden and Norway only two gasoline grades are marketed: leaded Premium (RON min. 97/98) and unleaded Premium (RON min. 95). Unleaded regular and premium fuels, as well as premium leaded fuels, are widely available in West Germany. In the Netherlands leaded regular has been replaced with unleaded regular and unleaded premium (Eurograde, 95 RON) through the use of the tax incentives listed in the Table.

Council Directive 87/416/EEC amending Directive 85/210/EEC on the approximation of the laws of the Member States concerning the lead content of petrol allows Member States to ban the marketing of leaded regular gasoline. (From the EEC countries, Germany has banned the sale of leaded regular from February 1988).

The Table shows how far the UK lags behind its European neighbours in the use of unleaded gasoline and how the tax incentive is often two or even three times as great to the motorist. A significant change in the incentive could cause a sudden change in the use.

UK refineries are ready.

Walter Carlyle, General Manager at Grangemouth

An aerial view of BP Grangemouth Refinery

Unleaded Tax Incentives
(Source: CONCAWE Report 4/88)

Country	Unleaded Tax Incentive: local money	Unleaded Tax Incentive: US cents/l	Sales % Total Gasoline	Comments
Germany	6.8 pfg/l	3.7	40	since Jan. 1986
Austria	0.43 ATS/l	3.3	30	from 1.4.87
Switzerland	8 c/l	5.3	30	Current
Sweden	0.20 SEK/l	3.1	33	Current
Norway	0.26 NOK/l	3.8	20	Current
Netherlands	5.4 c/l	2.6	20	Relative to Leaded Premium (add. 7 c/l on Leaded Regular)
UK	1.01 pence/l	1.8	<1	since March 1987
Denmark	0.38 DKK/l	5.4	30	since April 1986

The UK's apathetic attitude to unleaded petrol

Peter Noble reports

The oil companies have spent tens of thousands on forecourt conversions, millions of leaflets have been printed, numerous promotional events have been staged, and various government ministers have voiced their support — but whatever way you look at it, the great British public is simply not interested in buying unleaded petrol.

Admittedly, sales have increased since the Chancellor delivered a 5ppg price differential in this 15 March Budget, but the rise has been barely perceptible, and for the most part the new fuel languishes underground in forecourt tanks.

Ask those in the best position to know why sales are sticking at such a low level and their answers fall into three broad categories: promotion, price, and availability.

Promotion

To break the current impasse and put unleaded on the road to market dominance, the environmental pressure group, CLEAR (the Campaign for Lead Free Air) wants the government to do two things. Firstly, it says 2-star petrol should be banned, and believes that such an action would greatly boost sales because almost all cars that can run on 2-star can run on unleaded. In addition, it argues that the grade's removal would free-up retail tankage and pumps for the new fuel.

CLEAR points out that EEC legislation allows member states to ban 2-star if they wish, and holds up West Germany as an example of what can be achieved if that option is exercised.

In February, the Germans banned 2-star in an effort to improve sales of unleaded. They were not disappointed, sales rocketed.

Before the ban, unleaded had 27 per cent of the market, while by the end of this year it is confidently expected to have 40 per cent.

Despite the impressive gain, a similar ban here is viewed cautiously. In Britain, 2-star has a much smaller and fast declining share of the market and its removal would not have the same degree of impact on unleaded sales. In addition, 2 and 4-star blenders are common and any removal of the grade would have to be carefully phased over a long period if problems were to be avoided.

The second plea made by CLEAR is for a national TV campaign to educate the public about unleaded and promote its use. 'The message needs to reach every home,' says a spokesperson, 'and the government has the resources to do that.'

The call for greater effort by the government is echoed by Ian Berwick of the UK Petrol Industry Association. 'You get the impression that the government feels it has done its part by setting a price incentive,' he says. 'It is being passive about the matter and not mounting any campaign on the desirability of using unleaded. The big message that has not got through to the public is that if they drive one of the 1.8m vehicles that could use unleaded without engine adjustment, or if they convert their vehicles to use it, they can still use leaded petrol. They think they will be stuck with unleaded and may not be able to get it.'

Dr Berwick also feels that the car industry could do more on the promotion front. 'The car makers have been helpful in producing data on which models can use unleaded or need adjustment etc, but by and large they have not put their head above the parapet as far as new cars are concerned. Unleaded could be more strongly promoted as a feature of a new car.'

One car maker who is doing more than most is Vauxhall, which has offered to convert any of its cars up to three years old free of charge. The offer has been a considerable success, and Vauxhall reports that thousands of cars have had free ignition timing adjustments to enable them to use unleaded.

Price

Promotion and education campaigns are one way of tackling motorist inertia, but most agree the most effective method is the use of price differentials. That said, the impact made by the Budget remains ill-defined. In June, the Under Secretary of State for the Environment, Colin Moynihan, told parliament that the Chancellor's generosity has resulted in 'a big step forward in terms of consumption.' But Ian Berwick believes it is too soon for a clear pattern to emerge.

'The early signs are that sales could be much higher, but still on a very low base,' he comments. 'We know that sales are substantially up on sites that have been selling unleaded for some time, but we need to see more evidence of what the Budget has achieved. Unleaded is the cheapest petrol around, but that message has not got through to the public.'

Others are critical rather than cautious. The Opposition spokesman on the environment, Allan Roberts, believes the current differential is 'woefully inadequate,' and a recent Environmental Select Committee recommended that if the differential 'does not result in a marked increase in sales, the government should institute a further public information campaign on television and in the national Press ... and consider further increasing the differential in its next Budget.'

The concensus in the industry is that a substantial rise in the differential is needed if sales are to accelerate, and that it may need to be backed by other motoring taxation incentives.

Bill Gover, general manager, retail sales, Jet, however, is not confident the government will act decisively in promoting unleaded. 'I have a feeling it will continue to be little more than mildly interested in the fuel and to live with increasing embarrassment in the EEC until the October, 1990 deadline arrives, when all new cars will have to run on unleaded. It will hold out till then, and if that does not do the trick it will ban 2-star.'

So far, one in four of Jet's 250 company-owned stations are retailing unleaded, although sales are far from encouraging. 'As far as our 800 dealer outlets are concerned, we have received enquiries from just a couple of dozen; that is an indication of the level of disinterest.'

He adds: 'There are three reasons why unleaded is not successful. Firstly, there is not enough daylight between 2-star and unleaded, my personal view is that we need at least another 3 ppg. Secondly, the public imagination has not been stirred about the problems of lead in the air. I would like to see a major media drive. Thirdly, there is confusion about which cars can or cannot run on unleaded. That, essentially, is a problem for the vehicle manufacturers. As retailers we cannot affort to give advice that may prove wrong; we are not the experts in that regard.'

The case for a sales incentive is strong, but as we learnt earlier this year, the government is anxious to avoid the problems associated with a surge in demand swamping a service station network ill prepared to deal with it. That consideration is weakening all the time, however, as the oil companies install unleaded retail capacity.

Availability

The oil groups are demonstrating an impressive commitment to making the new fuel more widely availabile. At the time of the Budget, unleaded was available on just 700 sites. By June that figure had soared to 1,250 and on its way to the year-end estimate of 2,000. Availability is, of course, the flip side of the price coin. Motorists can be motivated by a price incentive, but on a commodity like petrol, they will be reluctant to commit themselves until they can be assured they can buy it when and where they want it.

Despite the fact that five or six sites a day are receiving unleaded capacity, Ian Berwick believes that faster progress is possible. 'Many companies are still in low gear,' he says, 'and if they see the market beginning to move they will change up to a higher gear.'

It is easy to understand their caution. Unleaded has demanded a considerable refinery investment and because of the low volumes involved is expensive to distribute. In addition, the low sales levels have forecourt implications. Turning over a pump that may handle 25 per cent of a site's volume to a grade that accounts for just 1 or 2 per cent plays havoc with forecourt economics.

All in all, unleaded in Britain seems to be perilously balanced between failure and success. The deciding factor will be the level of commitment the government is prepared to display on the fuel's future. The lessons of the recent past are that unleaded needs to be more widely available. It also needs far greater public awareness, but most of all it needs a more meaningful price advantage. ●

Additive injection and dye marking systems

By PR Armstrong, Hyrolec Technical Services Ltd

● The injection of additives and dye markers into petroleum products has become a specific requirement to an increasing number of refineries, petroleum and independent storage companies alike.

● In general, the ever increasing use of additives used to improve the performance characteristics of automotive fuels is carried out at bulk terminals prior to loading of road tank vehicles.

● The injection of dye markers in to gas oils and kerosenes is carried out at refineries and storage facilities. This injection takes place prior to ship loading, rail loading and more recently main line transfer.

● This paper describes the various methods and control of inline injection.

Introduction

The use of gasoline and diesel additives is increasing. There are certain companies who have had additives for some considerable time. They in turn have looked closely at the various methods of injection, control and reconciliation.

The ever growing product exchange agreement has meant that special regard to other users requirements must be considered. Therefore, the possibility of cross contamination between additives both in the product or in additive bulk storage must be eliminated.

Accuracy and repeatability of injection rates at all times has become paramount.

Systems should allow flexibility to enable injection rates to be changed as new additives emerge, and minimise interface problems with existing batch control systems.

Finally the monitoring of system performance at all times during operation to provide proof of injection as required. In keeping with the aforementioned operational requirements, consideration must be given to the physical constraints that exist at most locations.

The need to ensure where possible that the equipment be compact, robust and easily maintained must also be taken into account.

With regard to Dye and Customs markers, the use of inline injection systems enables improved operational flexibility to be achieved. Previously dye marking in bulk storage has been favoured by customs and excise. However, the emergence of systems that satisfy and conform to customs regulations has meant that refineries and storage companies can now with confidence, dye mark during product transfer operations into ship and rail loading. A more recent occurrence has been the approval in principle by customs to allow the marking of product directly in to main line transfer, thus releasing costly refinery storage space.

In association with the industry, HYROLEC have produced a range of injection equipment designed to meet the needs previously described.

The multi-pulse injector

What is seen by many as the first Multi User system of its kind is soon to be installed at a major terminal in the UK. The system is designed to cater for the additive injection requirements of three companies each injecting their own additives into gasoline and diesel.

The basis of this system is the Multi-Pulse mechanical injector. Designed utilising a well proven dispensing technique, the Multi-Pulse has been developed with space saving and ease of maintenance in mind.

The circuitry requirements of the system is met within a pre drilled manifold block, this reduces the amount of pipework required, hence the envelope size is reduced. Mounted on the block are the control valves and dispensing cylinder, each of which is very easily removed greatly improving maintenance.

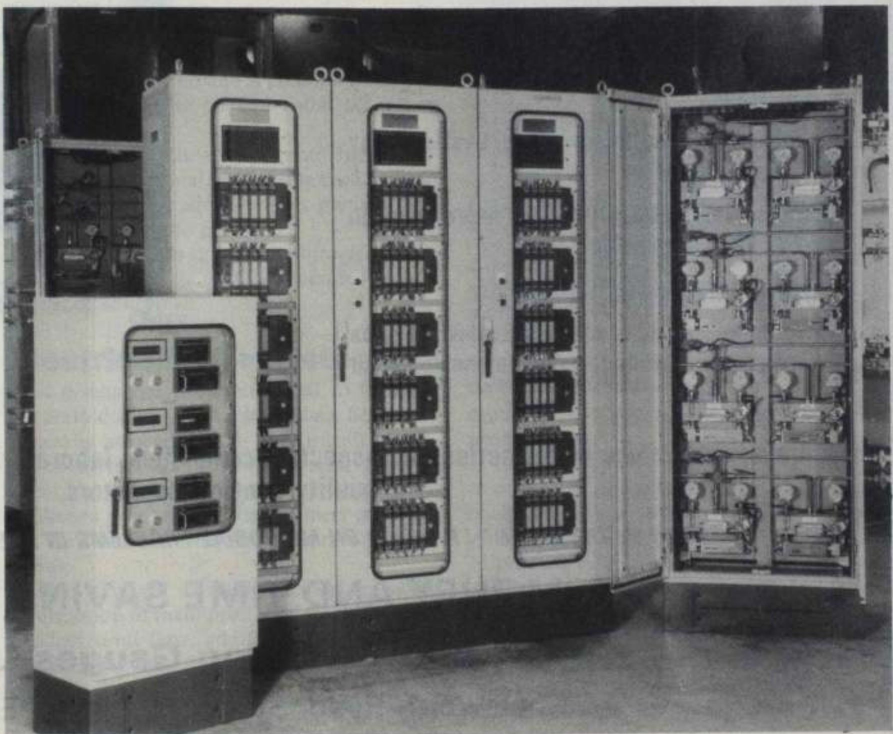
At this particular terminal the requirement is for injection into 22 loading arms, thus 66 injectors are required, therefore the space saving gained by this design will be no doubt appreciated.

Control and monitoring

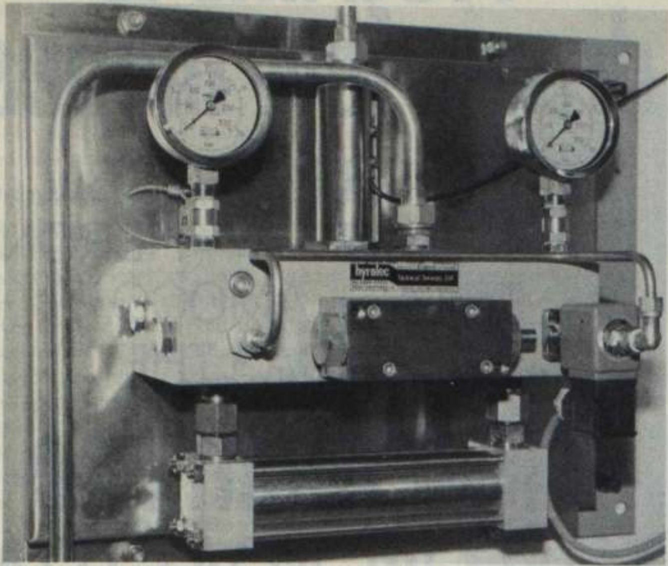
A comprehensive control and monitoring system is provided for each company. The control philosophy is to utilise a dedicated P.L.C. per gantry. The P.L.C.'s have input/output status indication displayed. The control cubicles have glazed doors through which system status can be clearly viewed at all times.

This segregated control system approach ensures optimum company security. The use of a P.L.C. per gantry maximises flexibility with respect to programme change and simplifies fault finding and remedial action. Also housed within each companies cubicle is an additional larger P.L.C.

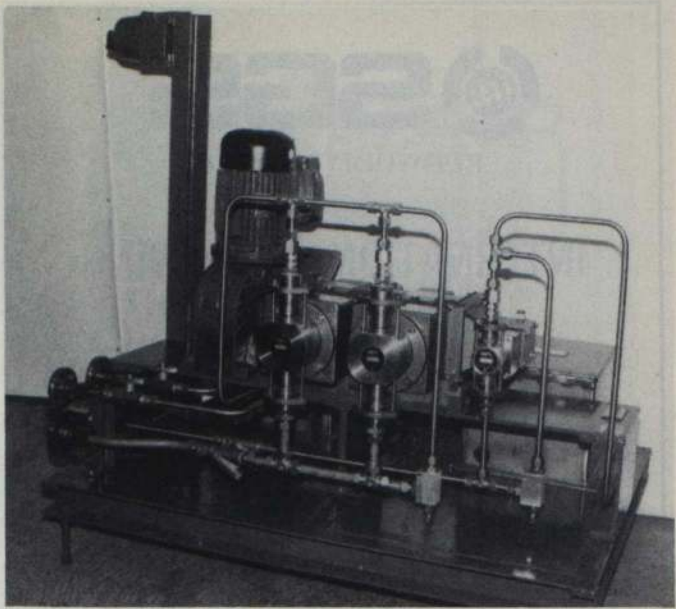
The unit is programmed to start/stop cascade and toggle additive pressurising pumps as required. It also monitors each loading arm with respect to product and additive throughput. At a predetermined time, every 24 hours, the monitoring P.L.C. down loads information to a printer package.



This picture shows a 3 Company PLC control system with monitoring package, and one of six multi-pulse gantry panels.



Multi-pulse injector.



Electrical drive system for injection of Dye Marker into Gas Oil and Kerosine.

This provides a hard copy report showing date, time, arm and product designation, total product and additive flowed per arm factorised in litre readings, the additive ratio and P.P.M. injection rate per arm. A message display unit is also incorporated in the printer package, on request the message display will scroll through each arm giving arm designation and current P.P.M. injection rate.

System operation

A boost pump skid frame will be mounted adjacent to the additive storage tanks. The duty pump will be started when an initiation/identification signal is received from any loading arm. At the same time, the inlet/outlet valve on the 'Multi-Pulse' associated with the company and the loading arm in use is energised.

Additive is now available at the 'Multi-Pulse' and dosing will commence when product loading begins.

On receiving an incoming signal relative to product flow the P.L.C. software is such that the required output pulse is generated. The rate of pulse in combination with the adjustment of the Multi-Pulse displacement cylinder controls the accuracy of the system.

After generating an output, the P.L.C. interrogates a cylinder switch to prove additive is flowing into the product. Should the cylinder switch indicate 'no movement', an alarm output is generated, visible on the front of the P.L.C., and a common alarm is raised in the control room.

On completion of loading, the identification signal is removed. On losing this input, the P.L.C. stops the boost pump, de-energises the Multi-Pulse inlet valve, and if the 'Multi-Pulse' is energised, sets an internal marker before switching the 'Multi-Pulse' off. This is to ensure that the 'Multi-Pulse' is always left in the de-energised condition.

If the marker is set when the next initiation/identification signal is received, the 'Multi-Pulse' will be energised before the boost pump is started. This ensures that the dosing cylinder and stroke valve within the 'Multi-Pulse' are set in the correct sequence before loading commences.

Additive totalising is carried out in the same panel. This is achieved by totalising P.L.C., this unit will receive a product pulse from the product meter and an additive pulse from the gantry control P.L.C. Both inputs will be totalised as full litre readings, and at a predetermined time can print out and zero. Printout will give all user information, date, time, totals, ratio and rate. Printout on display are also available on demand.

Further reconciliation checks can be made from the piston flowmeter mounted on the boost pump skid.

Additive tank level is continuously monitored raising a tank alarm on the control panel and a common level alarm in the control room on falling level.

Additive pressure is monitored when the boost pump is running, raising a low pressure alarm on the P.L.C. and a common 'additive fault' alarm in the control room on falling pressure.

Should the additive have exothermic properties then additional monitoring such as additive temperature, additive flow, pump casing temperature can be provided.

All alarm points that are monitored are fed to the P.L.C. and then either generated as indication or shutdown.

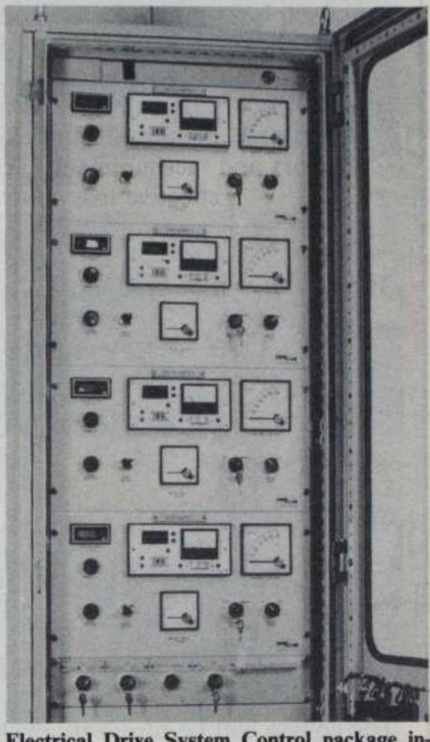
Electrical drive systems

This system has been developed to facilitate accurate dosing into high product flow rates generally associated with bulk transfer.

The system comprises of a skid mounted pumping set driven by a variable speed explosion proof motor sized to meet the product flow and additive injection rate requirements.

The standard control package provides information of main product flow m^3hr, main product total flow, additive flow rate l/min and additive total flow. A deviation alarm set point is also provided.

The system operates by sensing the product flow. This signal is converted within the control package to provide an input to a variable speed drive unit which in turn drives the skid mounted electric motor at a speed relative to product flow.



Electrical Drive System Control package incorporating 4 Standard Control Units in one centralised enclosure.

The electric motor is coupled via a gearbox to positive displacement pumps. Each pump is equipped with a vernier adjuster to control pump output. This allows the ratio of additive to product flow to be accurately adjusted.

The additive flow rate is monitored by a positive displacement flowmeter which provides a pulse output to the control unit where it is scaled and compared with main product flow signal. If the dosing rate deviates outside the preset value set on the control unit an alarm is initiated.

A meter on the front panel shows approximate deviation between flowrates over the

range 0 to 30%.

Additional front panel controls provide auto/manual selection and motor control. An emergency stop push is located on the additive pumping unit.

Should it be required both remote operation and indication can be provided.

Print and charting option

The electrical drive system standard control package can be further enhanced by the provision of a printer and chart recording package. Operation is as follows. As a signal is given to the standard control system, it is also received by a programmable controller and relayed to a printer to give a start date, time and product package. The control system operates as previously described. However, in the event of deviation between product flow rate and preset dye injection rate not only will the alarm initiate but at the same time the P.L.C. will print-out date and time at which this alarm occurred.

The P.L.C. monitors product flow and additive flow throughout the product package movement, on completion, the following information is printed

1 *Date and Time*
2 *Product Designation*
3 *Any Deviation Alarm printed with time*
4 *Delivery completion date and time*
5 *Product total* m^3
6 *Dye marker/additive total litres//'//*

In conjunction with the printout facility is a 2 pen chart recorder which provides a dual trace representing product flow and additive flow. This additional facility confirms injection rates throughout the product movement and any deviation alarm printed can be verified by a deviation in the additive/product trace. Therefore injection rate linearity is constantly monitored.

Injection turbine

This method of injection is also used where high volume throughput is encountered. The 10 inch turbine for example is capable of handling product flows of up to 13,620 litres per minute and injecting up to a maximum of 2,000 ppm of additive or dye.

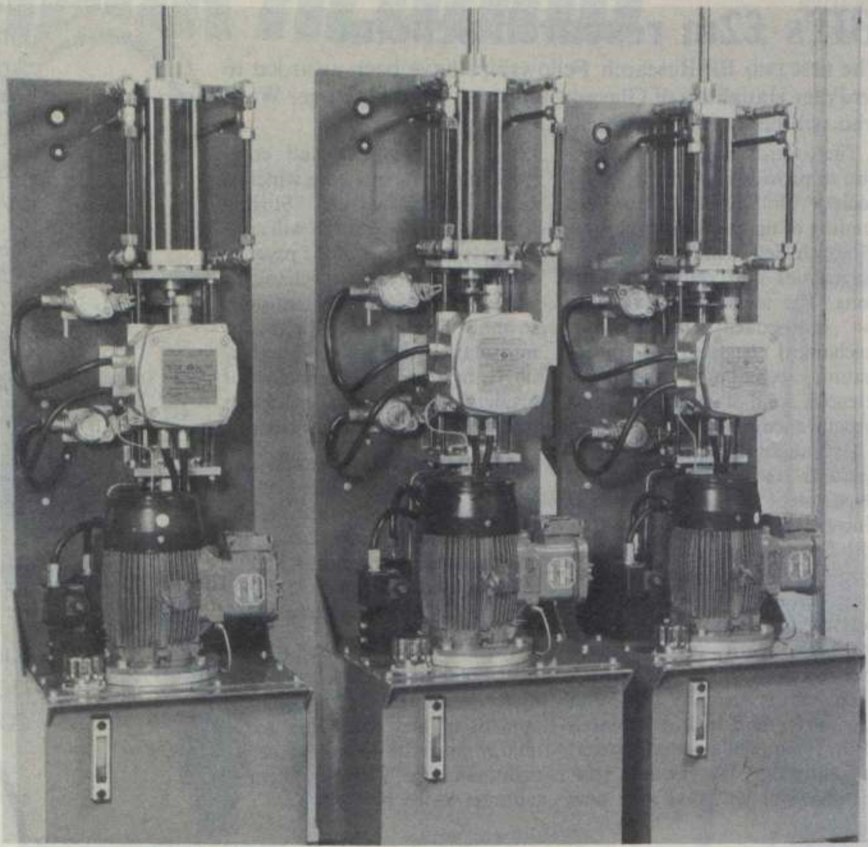
The turbine is supplied completely self contained and tested at our factory. The unit can be easily installed into the product supply line.

Due to its mechanical simplicity and rugged design, minimal maintenance is required. Reliability is a key factor with only one moving part — the turbine wheel. The turbine wheel, shaft and bearings are made of stainless steel, the turbine casing is high quality cast steel, all housing are tested to double working pressure.

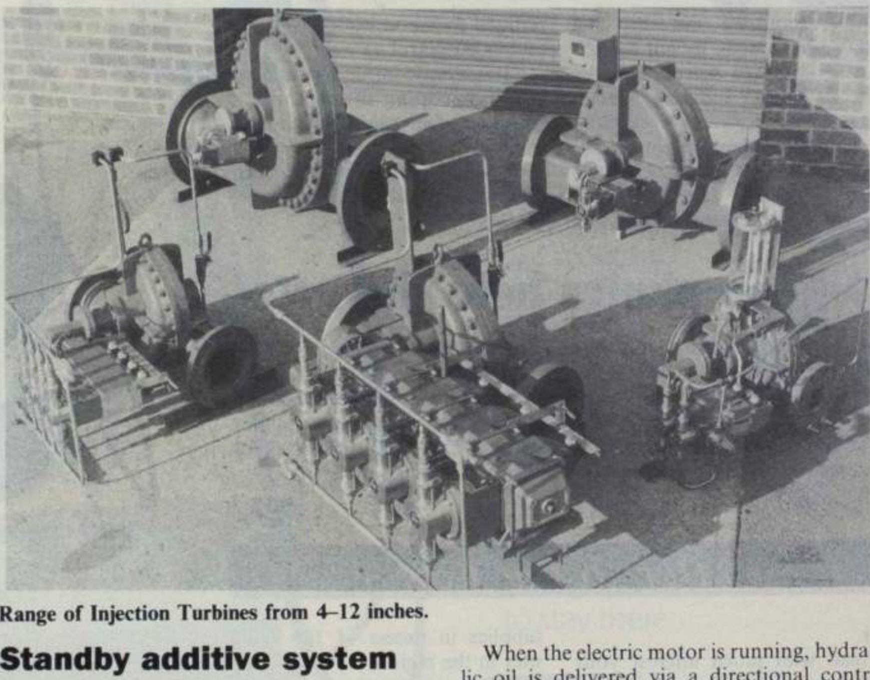
As with the electrical drive system described previously the same pumping approach is adopted. Positive displacement pumps are coupled via a gearbox to the turbine output shaft. Once installed and commissioned this method provides accurate injection in direct proportion to product flow. The minimal product pressure drop experienced across the turbine provides virtual 'free-power'.

Optional extras include a check measure or totalising flowmeter for verification of additive injection rate.

These units are available in sizes ranging from 4 inch to 10 inch and can be supplied with varying flange specifications.



A three-off Standby Additive System at the Hyrolec works.



Range of Injection Turbines from 4–12 inches.

Standby additive system

This system was originally designed to fulfil the injection requirements at smaller sites. However with the growing need to ensure that injection takes place this unit now provides back up to the more sophisticated systems.

The unit dispenses the additive directly into the road tanker. The system consists of a control box and hydraulic power pack, comprising of a hydraulic oil tank on which are mounted a motor pump set, a directional control valve, a dosing cylinder and two limit switches.

When the electric motor is running, hydraulic oil is delivered via a directional control valve to operate a hydraulic cylinder. This is directly coupled to a dosing cylinder, supplying a measured volume of additive. An overhead Festoon arrangement carries the additive hose, which the operator inserts in to the appropriate compartment of the tanker, he then programmes the control box for the required amount of additive the unit will then carry out the number of strokes required to deliver the correct amount of additive.

This operation is then repeated for each of the vehicles compartments. ●

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BP's £2m research scheme

The first two BP Research Fellowships have been awarded to Dr Peter Haughton of Glasgow University and Dr Roger Watt, who will be working at Stirling University.

The awards follow BP's decision to provide £2m to the Royal Society of Edinburgh for the funding of up to six Postdoctoral Research Fellowships in Scottish universities and central institutions. The awards are available for independent research in mechanical engineering, information technology, geological sciences, solid state sciences and organic chemistry.

Dr Haughton is currently postdoctoral research fellow at the Department of Geology at the University of Glasgow. Working with Spanish geologists from the University of Granada, his three year research programme will examine geological formations in Southern Spain and Northern Morocco.

Dr Watt is currently a research scientist in the Medical Research Council's applied psychology unit in Cambridge. His research programme will be based at a new centre for cognitive and computational neuro-science which is being established at Stirling University. His research will concentrate on a study of the psychological and physical mechanisms of human vision. The intention is to apply the findings to the area of information technology, particularly in the development of artificial vision for machines involved in industrial processes.

Announcing the awards, Sir Alwyn Williams, president of the RSE, said BP's £2m gift would have "profound and beneficial repercussions throughout higher education in Scotland." He added that the scheme had attracted 35 eligible candidates.

BP managing director, Basil Butler commented: "The development of new ideas and technology must be a big factor in maintaining BP's long-term commitment to the North Sea.

£2m unleaded throwaway

British motorists are throwing away £2m a week by not switching to unleaded petrol, says the UK Petroleum Industry Association.

The reason they are not switching over, claims the association's director general, Ian Berwick, is they do not realise that cars retuned to use unleaded will run on leaded petrol as well.

"It is a basic misunderstanding and it is costing the motorist a fortune," he said. "Although sales are rising, there are still seven million cars that could run on unleaded with just a minor retune."

Oil companies help the arts

Shell has put £3m into a joint venture with the British Academy of Film and Television Arts to increase international awareness of what our film and television industry can do. Mobil is giving the V&A £150,000 to produce a map and guide to bring simplicity and clarity to a complex institution. Texaco is providing prizes of £750, £300 and £100 for talented Welsh solo instrumentalists between the ages of 14 and 19.

Letter to the Editor

Sir,
I read with much interest your article on page 4 of the *Petroleum Review*, July 1988, regarding Hargreaves to supply unleaded. I think my Company may have had the honour to be first. We supplied unleaded petrol for resale to Worlingham Motor Company in Norfolk on 6 April, 1988.

Phoenix Petroleum (The East Anglian Fuel Company) is now the largest private, independently-owned fuel company in East Anglia and currently supplies in excess of 100 retail sites in the region.

With our network of sites selling unleaded petrol and strategically sited throughout the region at Norwich, Beccles, Newmarket, Cambridge and March. Further sites are being added in the coming months.

Yours faithfully
PHOENIX PETROLEUM LIMITED

CWG Butler
Commercial Director

BEATABLE TRACK RECORD

for expansion to 32 positions. The system incorporates a Winchester disk drive, providing considerably increased memory capacity for up to 50,000 PLU's, 10,000 local accounts and 20,000 hot card files. Thirdly is the Highline 1 and Highline 2 Doubleline, a simple solution to the introduction of unleaded petrol. Providing two fuel grades through separate nozzles in a side-by-side configuration, each servicing both sides of the pump island. Available as new units or on-site conversion of existing blending pumps. The introduction of the Miniline pump completes the new product range. A stylish, low cost electronic computing petrol pump incorporating the latest in forecourt technology. Available in single and dual models with LCD computer display and featuring Gilbarco's proven electronic and hydraulic components.

Finally, to permit more distinctive grade identification, all future Highline 2 pumps will be supplied with completely redesigned stainless steel nozzle boot assemblies.

We believe these new developments make the Gilbarco product range, like our track record, unbeatable. Add to this our reputation for product quality and reliability plus the finest installation and service network available in the UK you will see why we remain the number one in the market place. And we aim to stay there.

THE DOUBLELINE

Gilbarco

Crompton Close, Basildon, Essex SS14 3BA.
Telephone: Basildon (0268) 3090
Telex: 99231

Distribution focuses on three areas

The distribution revolution goes on as the oil companies continue to seek improvements in efficiency and cost reduction. Leading the charge are Esso, Shell, BP, Texaco and Mobil, who are investing millions in new technology to ensure their competitiveness and survival.

Such investment is being channelled into three principal areas of the distribution chain: terminal automation; computerised ordering/scheduling; and new equipment, such as bottom loading gantries and tankers, and vapour recovery systems.

Esso's current programme of terminal automation involves eleven locations. Work at four — Purfleet, Manchester, Nottingham and Birmingham — has been completed, while a further five are in the process of redevelopment, at West London, Hythe, Avonmouth, Tynemouth and Dublin. At the remaining two locations, the necessary computer systems have been installed, but other facilities are still being established. Vapour recovery systems have been installed at five Esso terminals, and, intriguingly, at one retail location. The service station in question is in Loughton in Essex and has been successfully recovering fuel vapours on the forecourt for several months. The company says it is a pilot exercise that will produce valuable data and could lead to the wider introduction of such systems.

Unmanned

Another retail first for Esso was the recent opening of a 'ghost' station. The site — Centre Link in South Yardley — is open 24 hours a day and is completely unmanned. The 'cashiers' are electronic payment terminals which accept credit cards and cash.

The site is administered by Adrian Harris, who runs a number of other Esso sites in the area. Adrian or one of his staff visit Centre Link once a day to empty the terminals and check the site. In addition, a sophisticated alarm and video security system keeps a discrete eye on the forecourt. Plans are in hand to extend the forecourt's facilities further with the introduction of automated car cleaning equipment.

Electronic tank gauges show when a delivery of product is necessary, although, obviously, that delivery has to be supervised as normal.

The site opened in April and is being evaluated over 12 months. If it is successful, other unmanned operations could follow, but for now, all Esso is saying is that it is progressing well. 'Some motorists drive onto the forecourt and pull away thinking it is closed, so there is an educational gap to close,' said a spokesperson. 'There is also a problem with motorists not remembering their PIN numbers, but the site is growing in popularity with locals.'

A development of more immediate value to the Esso network is the centralisation of the company's fully automated customer ordering activity at its West London terminal. The new facility was inaugurated in July. It replaces the company's four customer order points (which had directentry ordering) with a a single centralised facility. It is based on an IBM system which Esso claims is unique to the industry.

Shell

Shell is similarly making headway on its plan to upgrade its 12 core terminals. The Leeds location was the first to be given an injection of new technology and it has served as a pilot for the others. Building on the experience of Leeds, Shell is now developing its three largest locations — at its two refineries at Shellhaven and Stanlow, and at Buncefield. To date, bottom loading gantries have been commissioned at Stanlow and Buncefield, with Shellhaven to follow. Vapour recovery equipment has also been installed at Buncefield on a pilot basis.

Over the past year, Shell has increased the number of 38 tonne road tankers in its fleet of 400 vehicles to more than 200. It also confirms that its fleet of 70 or so plastic tankers continue to perform well.

'We are pressing on steadily with our programme and making progress, said Albert Hillerby, Distribution Division, Shell UK Oil. 'We are on course and very pleased with what we have achieved so far. Basically, what we have done is to bring the operating and administrative environments together with computerised control. We have also added communication capability and are making maximum use of the data in the system.'

£50m invested

BP has committed £50m to revitalising and modernising its distribution operation. The bulk of that sum is flowing into its eleven core terminals, although the company is also replacing obsolescence at its 16 dry depots. The first two terminals to be modernised are Kent and Swansea, with Kingsbury and Southampton close behind.

The Company has four new distribution control and administration centres — Glasgow, Manchester, Bristol and Hemel Hempstead.

The test-bed for Texaco's terminal automation programme is its Manchester location, which is now completed and running successfully. It will be followed by Avonmouth, which will be operated by Bristol Oil Storage Ltd, (a Texaco and Fina joint venture). The other eleven Texaco core terminals will be upgraded in an on-going £27m programme over the next five years.

The past twelve months has seen two significant distribution developments. A computerised vehicle routing programme, called Paragon, has been introduced at the Texaco Swindon central ordering facility.

'What we have done is take the heartache and guesswork out of routing and further enhanced our fleet efficiency,' commented an executive. 'The benefit for our customers is that we can give reliable ETAs.'

The second development is a programme called Padloc, which is, basically, an economic reassessment of delivery areas. It looks at the total cost of getting product from source to customer.

A key element in that reassessment and the changes it is bringing is the flexibility of the company's fleet. Texaco was in the vanguard of the oil industry's movement towards contracting-out fleet operations to specialist distribution companies. Amoco started the ball rolling in May, 1985, when it handed over the running of its road tankers to Wincanton. Texaco followed a few months later, and has since been joined by Q8, Gulf and Burmah Castrol, (see *Petroleum Review*, June 1988).

Voice-chip

A further customer-benefiting innovation shortly to be phased in by Texaco is voice-response ordering. Customers will be talked through the ordering process by a pre-recorded tape. They will then use a key-pad to input order information. The development will extend ordering time out of hours.

Mobil is well into a £3m five-year plan to modernise each of its four wet terminals by 1990. The first to be completed was Kingsbury. The company is also involved in a joint venture with Unitank at Wymondham, which features the latest distribution technology.

For the minor brands, modernisation of distribution facilities and systems has a lower profile. The view of many is summed up by Alastair W Clark, general manager, Operations, Conoco: 'I still see safety, quality of service and cost as the three prime criteria of a distribution system. New technology for its own sake does not come into the equation and we, therefore, may appear to be dragging our feet when compared with some of our competitors.

'Having said that, I know that legislative pressures and some equipment obsolence are taking us down the route of changing some of our facilities and equipment. We know and understand the technology required, but until we see positive reasons to make changes to our systems, we are unlikely to invest significant funds.'

Leak testing footvalves fitted to bottom loading road tankers

New IP Guidance Note to be published

Graham Holiday, Manager Transport Engineering, Technical Department, Esso Petroleum Co, Ltd. reports

Tank trucks designed for 'bottom loading' are becoming more and more widespread. Loading the truck through the discharge valves and pipework is quicker and much safer than loading from the top. Drivers appreciate the cleaner conditions.

However it was obvious to the members of the IP Marketing Sub Committee's Conveyance Panel that there was one aspect of the design of the 'bottom loader' which needed some attention. Leaking footvalves cannot always be easily identified!

The IP Code of Practice for the design and construction of road tankers requires that each compartment be fitted with an internal stop valve and a secondary external closure valve. The pipe between these two valves should be designed to break when subjected to excessive strain at a point as close as practicable to the internal stop valve, leaving the internal stop valve intact.

The primary purpose of the internal stop valve (or footvalve) therefore, is to prevent leakage in the event of accidental damage to the pipework or secondary external closure valve (ie outlet valve).

For a top loaded tank truck, where the compartment run-off pipework remains empty during transit, the integrity of the footvalve and seal is frequently monitored by the truck operator who, prior to discharge, will visually check for product in the run-off pipe which may have been passed by the footvalve. A defect reporting system should ensure that the footvalve is subsequently checked and rectified as necessary.

This facility for informal checking is not available for a bottom loaded truck as the run-off pipes remain full during transit. A formal periodic test is therefore required.

The Panel C working group set up to consider the problem has recommended that annual tests be carried out. An IP Guidance Note is to be published setting out the background to the recommendation and describing both vacuum and wet test methods.

Tests involving pressurisation of the tank or outlet pipework are not recommended by Panel C.

IP Safe Loading Pass Scheme

In the April issue we published the text of this scheme.

Learning from experience gained since the introduction of the scheme by a number of major companies the following modifications have been made to the text:-

Clause 4, a second paragraph has been added. It reads:

- 'A road tank vehicle not being operated on behalf of a participating company and without a valid pass, must be inspected by the participating company at whose terminal the vehicle is to be loaded.'

Item 5 of the guidance note for checking road tankers now reads as follows:

Earthing Connections on Tank

- The tank and its associated pipework and fittings should all be in good electrical contact with each other and with the main metal structure of the vehicle such that the resistance to earth is at all points less than 10 ohms, in accordance with BS 5958.
- Suitable earthing pin(s) must be fitted.
- An electrical continuity check should be carried out with a suitable tester, one such tester being a Metrohm Insulation Tester, Model 7A 501C available from Edgcumbe Instruments, Bothwell, Glasgow E71 SE2.
- Typical causes of high resistance could be broken earth braids, corrosion or incorrect gasket material.

The filling station signs dilemma

By Caroline Bennett

'Filling stations are as comprehensive a test of the signmaker's craft as you will find... uniquely tough at filling stations simply because the customers are driving cars as they buy.

'They don't just drive to or from the filling station, they drive on it, around it and through it.

'The car is possibly their only reason for being there at all, rather than a means of merely getting them there, as is the case with every other type of retail outlet.'

Esso's tigerish approach to station maintenance reinforces their commitment to Health and Safety, as well as good looks.

The above quotation was taken from the recently published Hawes Sign Guide. The Guide was compiled by Hawes Signs in response to increased sophistication in the materials and techniques which are used to interpret complex graphic designs. It includes several industry case histories, including a challenging article submitted by Conoco, extracts from which are included here.

Sign Test

In Conoco's opinion, no oil company has completely passed the filling station sign test, including themselves.

Millions are spent each year by major oil companies on signage and it is not unusual for companies to spend many hundreds of thousands of pounds 'tinkering' with minor variations to pole signs and subtle changes to graphics or colours.

The signage test for petrol stations presents major problems from the outset. Effective communication of the correct image is undoubtedly a major factor in all successful retailing but no other retail outlet has to communicate such diverse information in such a short space of time to such unique 'customers'.

Today's motorist is likely to visit a petrol station for any number of reasons and not simply the purchase of petrol. Indeed, recent research has shown that 20% of the cars that drive onto filling stations don't buy petrol.

Oil companies have encouraged the sales of widely divergent products in an attempt to attract increasingly discerning motorists. The range of products and services on offer has increased from motoring accessories and 'distress' purchases such as tyres and batteries to include related services such as car washing and vacuuming.

More goods

Modern petrol stations now offer an extensive range of confectionery and groceries and some, such as the new Shell Traveller's Check sites even provide the motorist with a postal service and dry cleaning facilities.

The increasing complexity of products and services has made signage requirements far more complicated. The dilemma facing oil companies is summed up by the following extract from the Hawes Sign Guide;

'It is because cars are accommodated that the signage test is so critical. Essentially the filling station is a retail outlet that is also an extension of the public road system, and therein lies the first dilemma.

'Are we directing traffic or making retail sales or can we do both with our signs?

'Even the out-of-town hypermarket can direct traffic until the customer leaves his car in the car park, but the buying and selling is a separate experience, in a separate environment inside the store with specific in-store signs.

'In this way the signage requirements are placed neatly either side of the threshold at the shop door. The filling station has no such luck. The customers are making buying decisions at the same time as they are making difficult driving manoeuvres.

'Which do you emphasise with signage, the buying or driving decisions, and if it comes to that, will the customer be sitting in the car or walking around — each position has different aspects to your signs. Indeed, do you have two sets of signs?

'However, it isn't just a matter of getting customers on and off the pumps... They have other reasons for visiting the station — car wash, cigarettes, visit to the toilet, using the airline or plain old asking the way. How do you maintain a balance between direction and promotion in every one of these cases?'

Attractive signs

Signage on petrol stations must first and foremost attract the attention of passing motorists, often travelling at high speed some distance from the station. It must immediately identify the site as a filling station and also identify the primary services on offer. The signage must also communicate the desired corporate identity and in most cases indicate the price the motorist can expect to pay.

This quite complex group of objectives must be achieved within a restrictive framework of legislation which controls, for example, the area of illuminated roadside signage permitted.

On approaching the site motorists must be directed safely and efficiently onto the forecourt with the minimum of distraction to inhibit driving manoeuvres. Nevertheless they must also be able to clearly identify their intended purchase or service, whether that is 4 star petrol, diesel, unleaded fuel, car wash, airline, toilets, telephone or shop for example.

Hazards

The motorist must also be made aware of possible hazards so warning signs must be prominently displayed. Continuous branding throughout is essential to maintain the strength of the corporate image and having made their purchase, motorists must finally be directed on their way.

One thing the oil companies could never be accused of when it comes to signage is subtlety. The nature and location of petrol sites is such that they must be self-contained in a range of different environments and this has historically led the oil

Texaco: dramatic nightime shot demonstrating the use of extruded acrylic for the canopy fascia, graphics and logo.

Esso pioneered the use of structural steel to neatly encompass a variety of messages traditionally carried on single polesigns.

companies towards aggressive branding, usually in bold primary colours. Anything that could possibly serve as an identifier is branded in corporate colours, from airline to waste paper bins.

The choice of colour on the filling station will obviously be dictated by the corporate colour scheme, but certain considerations still have to be borne in mind. People expect warm colours which will welcome them to the station and invite them to use the facilities on offer.

Another feature which is peculiar to petrol sites is the prominence given to the price sign. No other retail outlet displays the price of its product in such a bold fashion.

Conoco were the first to use price signs back in 1973 and their Jet brand got into the 'big six' league by always being lower in price than the competition, but even they are still intrigued by the riddle of the price sign as they explain in the Sign Guide: 'Leaving aside the government inspired idiosyncrasy of pricing in litres and gallons, you can be forgiven for asking why there is a price sign there at all. What other product's price is continuously displayed to everyone in sight of the outlet, and in tenths of a penny?... quite why the consumer sets petrol aside in this way remains a mystery.

The practicality is that a filling station operator will have to change prices frequently, in litres *and* gallons remember. There are two ways in which this can be done. Either a ladder is climbed and prices changed manually or changes can be made electronically from the kiosk. The manual method is potentially dangerous and tedious, while the electronic method is extremely expensive.'

Shell made the radical decision to drop the price of petrol from the all-important pole sign on some of their sites, emphasising instead the complete service motorists can expect from one of the new Shell Traveller's Check sites. The new sites are dubbed the 'forecourts with foresight' and cater for all kinds of motorist, from those who wish to be on and off the site as quickly as possible, to those who prefer a more personal service.

The forecourt has been built tc a new design, featuring individual pump islands and distinctive new style of canopy. Standard self-service is available at all filling positions, and all grades of fuel — two star, four star and diesel — are available wherever the motorist chooses to drive in. The new pumping units have separate hoses for each grade of fuel which are colour coded for extra clarity.

Shell: under canopy lighting, housed within heat bent and shaped opal diffusion panels, designed to enhance the unique canopy fascia profile.

Informative signs are clearly visible and positioned on the ends of each pump, indicating which lanes can be used for different fuels, automatic payment and assisted service. Self service is available in all lanes.

Prototypes for the new system of signage were built and tested at the Hawes factory before final installation.

A guiding principle in the new Esso style has been to remove the clutter of conflicting signs and convey an impression of modern efficiency by using clear design and easy to read signage. Vital information is carefully positioned and signs have been grouped together using blocks of colour for ease of identification. The company name and image is expressed in red and messages in blue. The very clear type style makes the signs easy to read and each is carefully framed and positioned.

The canopy face has a flat surface, white border around the deep blocks of red and black edging which is echoed on the pole sign — Esso's major identification sign stands in the prime position and shows fuel prices in clear, legible numerals. Black is again used for the canopy support columns to give a sense of strength and stability to the whole structure and base panels and spreader boxes are colour-coded to help distinguish between the types of fuel dispensed.

The use of neutral colours for buildings and forecourts helps the sign blocks to stand out more prominently.

Texaco is instantly recognisable by the corporate star which seems to hang dramatically in the sky at night to attract passing motorists.

System 2000 is the name given to the latest design of Texaco filling stations which once again feature the star first introduced back in 1903 and revived in this country seven years ago after an absence from 1963 to 1981. Permanent signage at Texaco stations always carries a heading of white out of red and an information panel of white out of grey. Substantial illustration and photographic work is used on posters and promotional items which also bear the standard typeface.

'It could be argued that there is branding overkill at filling stations'

The pole sign carries price and credit card facility details and can also carry modules giving brief, succinct information on services available such as car wash and unleaded petrol.

System 2000's main objective is to attract the motorist using consistent signage which can instantly identify the site. Although brand loyalty is no longer such a strong incentive, brand awareness is still one of their priorities. The warmth on the forecourt comes from red spanner panels which run between the stanchions inviting motorists to take advantage of some of the facilities and welcoming them to Texaco.

It can certainly be argued that oil companies have passed the 'branding' test. Few petrol stations, even if they are privately owned, escape the corporate stamp in every available corner of the forecourt. However, this may well be to the advantage of small, private operators who can carry the authority and reliability of a multinational oil company.

But could it be argued that there is branding 'overkill' at filling stations?

Conoco say that: 'The oil companies' apparent success may be inhibiting subtlety of expressions such as humour or seasonality. The very 'fixed' nature of a formal brand doesn't easily allow for this. It cramps the ability to change with public mood and fashion. Until now, Marketing Managers in the oil companies have considered that this 'fashionable' response to the consumer is unnecessary with their product. After all petrol is petrol. But water was water until Perrier came along.'

The Hawes Sign Guide contains contributions from leading suppliers to, and customers of, the sign making industry including ICI, British Home Stores, Midland Bank, Thorn EMI and many others. ●

Copies of the Hawes Sign Guide, which is illustrated throughout in full colour, are available at £12.50 including postage, packing and VAT from Hawes Signs, Moulton Park, Northampton NN3 1EU. Telephone 0604 790000.

The Institute of Petroleum

NORTH SEA OIL AND GAS BEYOND 2000?

27th October 1988

This one-day conference organised by the Exploration and Production Discussion Group of the Institute of Petroleum will provide an overview of the prospects for continued production of North Sea oil and gas into the twenty-first century which is clearly of considerable importance to the UK economy.

Government policies will continue to influence the economic climate needed to ensure a continuing commitment to exploration activities in new prospective areas and development programmes for increasingly complex accumulations.

Business decisions will have to be reached project by project after assessing the relative merits of the varied technologies that are being developed to prolong the life of existing fields and to exploit new marginal and deep water discoveries.

In looking ahead the lessons of the past must be taken into account as a guide to those options that are most likely to be both successful and financially attractive.

The following papers will be presented:

Welcome to Delegates and Opening of the Conference by the Conference Chairman
Mr GC Band, Director-General, UKOOA Ltd.

National Considerations
Mr GH Chipperfield, C.B., Deputy Secretary, Department of Energy.

The Resource Base
Mr DDB Morrison, Director, Wood Mackenzie & Co Ltd.

Technology
(a) Improving Reservoir Performance
Mr AJ Dingley, Exploitation Manager, Ranger Oil (UK) Ltd.

Technology
(b) Facilities
Mr JB Cook OBE, Engineering Manager, Shell UK Exploration and Production

The Economic Framework
Mr D Fishman, Manager Economics, Energy Resource Consultants Ltd.

Lessons from the past in other areas
Mr GM Ford, Managing Director, Britoil plc and Dr DH Tehrani, Chief Reservoir Engineer, Britoil plc

Discussion Panel
To comprise the Conference Chairman and all Speakers

For a copy of the registration form, which includes the detailed programme, 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.**

The Institute of Petroleum

Management Development Workshop

1st November 1988

The Education and Training Committee of the Institute of Petroleum has organised a one-day Workshop on Management Development at the Institute on Tuesday, 1st November 1988 for those in or connected with the oil industry who are concerned with the development of today's and tomorrow's managers.

The aim of the Workshop is to examine the relevance to the oil industry of new concepts and practices for developing British managers. There will be an opportunity for delegates to share experiences and exchange views on key factors which have to be taken into consideration in implementing an effective system of management development. Topics to be covered will be:

Management Development — The Need for Change.

New Concepts for Developing British Managers.

Towards the Corporate Classroom: The W H Smith Experience.

The Academic Contribution.

The Contribution of Experience.

Implementing a System of Management Development.

Further details are available from:

Alan Lodge, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

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

The art of compromise in joint ventures

Dr Pierre Jungels, Chief Executive and Managing Director, Petrofina (UK) Ltd, discusses in an interview with *Petroleum Review*, how joint ventures can spread the risk, produce the right products and enjoy independence.

Dr Pierre Jungels, Chief Executive and Managing Director, Petrofina (UK) Ltd.

Geoffrey Mayhew: Petrofina is a particularly big player in joint ventures?

Dr Pierre Jungels: I would not call it a big player, but historically that is how we have approached our expansion in refining and chemicals.

What is the basic reason for joint ventures?

There are three reasons: one is that, alone, we could not justify building the size of plant which has world-class dimension. Another is that, by carefully selecting the partner, the joint venture will have the benefit of the best technology available.

The third is that, by its nature, the management of a joint venture is made up of exchanges of ideas which, in our view, improve the long-term technical efficiency of the plants.

Is the refinery on the Humber an ideal example of this in the UK?

The Lindsey Oil Refinery is a 50:50 joint venture between Total and Petrofina. Either one of these two oil companies could have set up similar refining units and therefore would have lost the opportunity to gain on economy of scale.

There is evidence that both companies contribute to Lindsey, something which would be difficult to have completely in one company, if you wish, because every oil company is individual in terms of how they run things and how they think about the world.

Having two of them in a management business is interesting. You get an exchange of ideas and views about how things should be done, and you tend to work the end result by compromise, which is always good.

Can you give us some other examples?

Yes, if you look at refineries first, our biggest refinery in Europe is the one in Antwerp which used to be called SIBP. It was a joint venture with BP, which allowed us to have one of the largest refineries in Europe in the right sort of place.

The other one is LOR at Immingham on the Humber River, with Total. Then, on the chemical side, we have Petrochim which was a joint venture between Phillips and Fina formed to build the largest ethylene cracker (at the time) and, additionally, polyethylene and rubber.

We also started initially with them a joint venture in the south of Belgium called Belgochim which was 50% Petrofina and 50% Phillips; and that one produced polystyrene using Fina technology.

After Phillips withdrew, the Belgochim unit evolved into a polypropylene plant as well, this time using Montedison technology. The whole thing became Montefina, which is a joint venture between Himont and Fina.

Amoco Fina, in Belgium, is a 50:50 venture with Amoco, which manufactures additives for lubricants. There used to be a joint venture with Ashland, which was 50% Fina and 50% Ashland, called Oleofina and which made fatty acids (Oleofina is now 100% owned).

Petrofina set up a joint venture by choosing a partner and setting up a company on a 50:50 basis, thus allowing bigger factories with, of course, consequent unit cost savings.

Most frequently, the commercialisation, marketing or production of these plants was left in the hands of the joint venture.

Since the early Eighties, Fina took upon itself the commercialisation of its own share of the products of these joint ventures by setting up an organisation called Fina Chemicals. On the refining side, products were always sold by the Fina network. As a result, most of the joint ventures became simple processing units for each partner.

So, Fina supplied base stock through a factory which was bigger, and so cheaper in terms of processing per unit, and took the production at the factory gate and sold it as Fina products.

Recently Fina acquired the share of some of the partners. This sometimes occurs because a partner needs to realise assets. For instance, we bought Phillips out of Petrochim.

It also sometimes means that the partner has completely different views about the world from ourselves, and that was the case with BP. They wanted to be under-refiner in Europe while we believed we must have high performance refineries producing a high quality of gasoline and diesel of the future; we wanted to upgrade SIBP so we bought them out.

The objective of Fina is not to be a 100% owner. We have to keep having the optimum size of plant with the latest technology, the latest catalyst, the latest upgrading facilities, etc., to have highly efficient units and, if our partner does not agree with the investment that it represents, then we make the investment alone. This triggers the sort of move towards 100% ownership of the plant.

However, we still believe that more restructuration is needed in both refining and chemical sectors. We believe that new joint ventures will be decided in the coming years. Our recent decision to make a joint venture with Neste Oy is a good example.

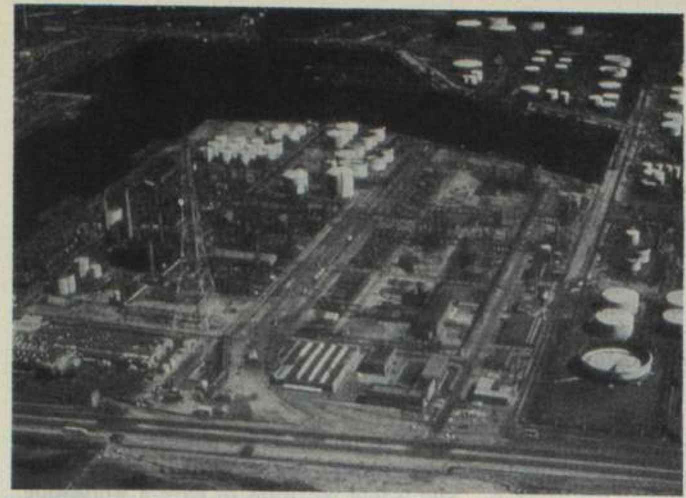
Relative to technology, that must have had advantages through the pooling of ideas?

Absolutely, yes. We believe that the small partners can contribute as much as the larger ones.

You have joint ventures in a scale of companies in addition to refining — in distribution, for example?

Yes, we also have joint ventures into distribution of oil products in Tunisia, Gabon and places like that. We would not mind having them in other countries. It is always a problem to find a partner who accepts the principle that, in a 50:50 joint venture, we are equal and that there is no attempt at saying 'I am the greatest and consequently I run the show and you just pay the bills'; it is a meeting of equals in a structure of 50:50 capital ownership. We also have joint venture distributors in the UK, such as Arndale, Lanfina, British Fuel Company, etc.

How do you operate on crucial Board



The Petrochim plant, producing ethylene, polyethylene and rubber, now wholly owned by Petrofina, began as a joint venture with Phillips.

The unleaded petrol units at Lindsey Oil Refinery, South Killingholme on South Humberside. LOR is a joint ventury between Petrofina and Total Oil (GB) Ltd.

Room decisions?

Basically, each of the partners makes his own thinking process on how he would want a joint venture to evolve, but the Board of the joint venture is replaced by an executive committee made up of people from both partners and it becomes a compromise. It is the art of compromise.

Do you get to a situation where there has to be a vote, and a casting of votes at a meeting aside?

No, you cannot really. It is 50:50; absolutely equal. So, it is a matter of convincing the other side if they feel what you are proposing is not acceptable to them, but, of course, you cannot get into a blockage situation, so there are ways in the contract of association by which one of the partners can do it alone; a little like a 'sole risk' clause in an exploration agreement.

If you have five partners exploring in a block in the North Sea and one of them feels that the prospect is extremely good and should be drilled, and the others have a different opinion, then you have in the joint venture agreement what is called a 'sole risk' clause.

But you cannot operate like that in a 50:50 joint venture.

No, so the system is planned so that, if you want to make an investment and your partner disagrees with that investment, then you do it 100%, or whatever percentage you feel is right and your partner feels is right for him. That unit is a little box inside the joint venture, with a different cost structure. At Lindsey Oil Refinery we have a propylene splitter which is 100% owned by Fina, so only Fina can use it, and the cost of running that splitter is clearly identified in the Refinery accounts. At the MTBE plant in Antwerp, before BP sold out, Fina had a higher percentage than 50% because we believed in the economics of MTBE.

Petrofina is as convinced on the value of joint ventures as it was when it started them?

Absolutely. There is no reason to change. I suppose that because we are Belgian we know the art of compromise. After all, we come from a nation which has invented the art.

The British are said to be great ones for compromise.

Yes, but as a small nation, with different languages, and surrounded by larger nations, Belgium needs to compromise all the time.

In the course of these joint ventures Petrofina has obviously got bigger and richer.

Yes. So have our partners. The key is that you have a much bigger unit, but you have access to 50% of it and it is how you use that 50% that makes the difference. Throughout its history Petrofina, by investing in these joint ventures, has used its capital availabilities wisely. Instead of having two plants at 100% each, we had four plants at 50% each and four different products, so we gained access to different markets, different technologies and acquired a lot of know-how in the process.

Would you look into the possibility of a joint venture over years before you actually did it?

There are no fixed rules. Sometimes our management, or those of our people involved in a particular branch of activity, would convince themselves that Petrofina needed to move into *that* sort of product, either because we had the availability of the raw material or because our marketers needed the product to sell; then we would analyse the economics of it, the optimum size of plant to produce that, and then we would say 'Do we go it alone or with somebody else?'.

At other times, we would meet another company and analyse with them what could be done together, or Company X would approach us and say 'You, Fina, are strong in this country or in that technology, let's do a joint venture'.

You tend to look for your other partner?

Not necessarily, sometimes they come to us; for example, the Fina/Neste joint venture to build a new ethylene cracker in Antwerp. At the time we were studying the possibility of upgrading or building a new cracker at Petrochim, so we talked to the Industry about the possibilities of the joint venture and Neste decided to come in with us.

Are there others which are due — or being looked at — at present which you can talk about?

We have recently started a new company in Malaysia to distribute oil products and lubricants, etc. We have built a blending plant to our specifications, with our technology, near Kuala Lumpur for a Malaysian partner, and we have entered into a joint venture with him.

We are studying these sort of things all the time.

The impetus of 1992 will cause more joint ventures to take place?

1992 could encourage joint ventures, simply because companies outside the EEC will find it useful to join forces with established European firms, or a company strong in a particular country will want to join forces with another with strength in another country, and cross-shareholding or joint ventures will not raise petty nationalistic objections.

South America or Latin America wish to get into the European Market — are they likely to choose joint ventures if they can?

One of them in particular, Venezuela, is very much taking the joint venture route. The Venezuelans are doing joint ventures with various companies around the world.

These are normally on a 50:50 basis; they bring their crude in that joint venture and the products are marketed by their partner or by a Venezuelan unit here in London. They have that kind of joint venture with Nynas, with a German company, and have done it with an American company. So, that is their route to downstream expansion, which is to do it on a 50:50 joint venture, and the reason is the same. They feel that by going down that route they get world-class plants and also obtain the goodwill and interest of a number of different partners, which is very different from the way the Kuwaitis have decided to do it, i.e. 100% owned by them.

Perhaps one has to choose between being a takeover company — a predator, shall we say — or whether to go in for joint ventures?

No, it is a question of whether you want full control or not. The difference is only how fast you gain access to what you want. As Nader Sultan of Kuwait Petroleum explained at the IP Lunch, as far as the Kuwaitis were concerned they wanted to control 100% of their destiny, so they built up a network which is 100% owned. The Venezuelans have taken the attitude that they want to have many partners, which they see as spreading the risks.

Safety in numbers?

In a sense, and access to markets in different ways, perhaps by not raising antagonistic reactions if you go on a 50:50 joint venture with local company. You perhaps do not get the sort of rejection phenomena based on petty nationalism. The Saudis seem to have chosen the same route of joint ventures, both at home for manufacturing, and in the US in the downstream with Texaco.

It is interesting that the oil industry has people able to do this.

Some oil companies do not believe in joint ventures — they must do it all on their own and do it their way — and they do not want to bother with partners; plus the process of management in a joint venture is more complicated than the control of subsidiaries, for instance. So, it varies. It is true that some industries have never imagined that a joint venture is possible. We are reported to have the first joint venture paint factory in the world, called Buckingham Coatings. Here again, we used the joint venture route because it allowed us to build a much bigger paint factory which we would have had for Sigma UK alone.

A worldwide exporter?

It exports some, yes, but Sigma is well known around the world as an anti-fouling, anti-corrosion paint, but that factory in Buckingham is for the household market. For that you need a factory producing at least 25 million litres a year, and to build the ideal unit size we took on a partner.

Pipelines are consortium-owned

That is different. They are fairly similar to an exploration venture. That is safety in numbers. You could not justify a pipeline on your own because of the enormous up-front capital involved. So, you do it with several partners, and those are the original investors in the pipeline who have shipping rights. The third party which did not invest can still pump through that pipeline provided he has access to it and egress from it, but he pays more per tonne shipped than the owners.

The same occurs for modern depots which will need very heavy expenditure in terms of computerisation, bottom loading, stock control, vapour recovery, etc., and it is easier to do if there are several of you because you can easily have 1 million tonnes throughout if you have two or three companies involved in it.

You do not class that as a joint venture?

Yes, but a multi-partner joint venture with one selected as the operator. A real 50:50 joint venture has a separate general manager. He has to be a diplomat because he has two shareholders, and two shareholders with very different views and he must navigate between two companies. It is not always easy, but above all he has to defend the interest of the joint venture.

But at Fina, we know the pitfalls of joint ventures, and also the advantages. This allows us to spread our risk, select the right products, select our partners and have all these plants being used as independent units with their own management.

On a larger, worldwide scale, a joint venture becomes like Royal Dutch Shell which, at the end of the day, was initially a joint venture; because it was not a true merger. There is still a Shell Transport Board and a Royal Dutch Board in Holland, which are separate entities.

That is *the* ideal example of a big joint venture which was a success on a worldwide basis. It was not a merger, it was not a takeover by any of them; it was a joint venture because the two entities remained separate.

What do you see as the pitfalls of initiating joint ventures in these times, for example you would not want to have a worldwide network? Is there a certain limit to the number of plants you want or the number of countries?

No, there is no limit. It is purely a question of profitability and whether the joint venture is going to make sense within your system, whether the partner you choose has the technology and perhaps the know-how you do not have, and whether it makes sense to build a bigger plant than you would on your own. It is not always the case, so it is selectivity which is the key.

The aim is to improve the quality or the efficiency?

Both. You need the best products in the line that you have decided you want to be in, with the latest technology, the most flexible plants and those that have the dimensions which give you the minimum unit cost.

If, by world standards, you are a medium-sized company, like Petrofina, you have to do that.

Because of this, we find it easy to start small joint ventures with venture companies or entrepreneurs, and we do not smother them. An example of this is our joint venture with a cooperative dairy in the province of Luxembourg, which produces milk extract proteins for the agro-alimentary industry.

It is a rather efficient way to help small businesses start up. ●

Inside the new £7 m computer controlled Buckingham Coatings Plant.

Oil is a sunshine industry

Sir Peter Holmes, Chairman, The Shell Transport and Trading Company, plc and a Group Managing Director of the Royal Dutch/Shell Group of Companies, said recently:

● 'People today are fond of talking about 'sunrise' and 'sunset' industries. Our belief in Shell is that oil is a 'sunshine' industry — and will remain so for many years to come'

Sir Peter was speaking on *Oil company strategies for the 1990s* to the National Association of Petroleum Investment Analysts/London Oil Analysts' Group Joint International Petroleum Conference in London.

He said, in part:

'There are three variables that I regard as fundamental to the oil world today, and remaining so through the 1990s and beyond. These are world economic conditions, in which social developments will play an integral part; politics, especially in the Middle East; and the actions of the Organisation of Petroleum Exporting Countries (OPEC).

In the increasingly competitive world that is in prospect, each company must identify its own strengths and weaknesses before it can decide its future role. Oil company, energy company, resource company or conglomerate? Integrated or specialised? Global or regionalised? Leader or follower? Only by answering such questions can a company develop a coherent, consistent, resilient and appropriate strategic vision for profitable development — not just for the 1990s but into the next century.

Scenarios are developed from alternative interpretations of current developments. By placing the numerous, often contradictory, signals within a context, they provide a common background against which strategic issues — and ultimately the implications for individual investment options — can be assessed. A company must provide for this kind of systematic analysis of the business environment.

The business environment in our two main scenarios is quite different. The high economic growth (3.5 per cent on average) of 'managed world' goes hand in hand with the development of very competitive global markets. The 'world in turmoil' (with 2 per cent economic growth) is characterised by protectionism and nationalism.

A consistent theme that emerges from such studies is the differences in the circumstances of the developed and developing worlds. This carries through clearly into the world of energy: demand growth is anticipated in the developing countries — through population growth, urbanisation, development of industry, use of commercial in place of non-commercial energy. In the OECD regardless of economic performance, energy demand hardly increases. Overall, however, world (excluding Communist areas) energy demand will almost certainly be higher by the year 2000 than today's 100 million b/doe. **Figure 1** indicates the likely outlook for the year 2000 under the two scenarios I mentioned earlier.

The outlook for oil demand also reflects the developing/developed world dichotomy, but there is little chance of anything more than modest overall oil demand growth.

The Iran/Iraq war, now nearing the end of its eighth year, continues to dominate the region that is at the heart of the oil world.

There are now signs among both belligerents of 'war-weariness' and greater flexibility and sensitivity in dealing with their Gulf neighbours. Any such wind-down to the point where a suspension of hostilities is agreed will present major budgetary strains as both Iran and Iraq begin the long task of reconstruction. Both States are therefore likely to wish to add to their oil production, further exacerbating the problem of quota allocation within OPEC.

Although OPEC's share of non-Communist world oil production is now only some 40 per cent compared with 60 per cent in 1979, its contribution to internationally traded oil is nearer 70 per cent.

Given the fragility of Middle East relationships, and the diversity of its members **(Figure 2)**, OPEC manages to retain a surprising degree of unity. The world oil supply overhang means that production discipline by major oil exporters remains central to the oil price, which is a key factor in the oil supply and demand balance.

Another — interrelated — key factor is non-OPEC production.

Recently published figures put total world proven oil reserves near 900 billion barrels. Of this, some three-quarters is in OPEC countries, mainly those in the Middle East. The USSR, Eastern Europe and China account for 8 per cent of the world total. Thus the rest of the world has just 17 per cent of the reserves and finding sufficient new reserves to maintain non-OPEC production levels will require a sustained high level of exploration activity. Production in the United States, in particular, has begun to decline, increasing that country's dependence on imported oil **(Figure 3)**.

The likelihood is, therefore, that in the next few years non-OPEC supply will plateau and then start to fall. Nevertheless, with world demand showing only modest growth, it could be into the late 1990s before the supply overhang is significantly eroded.

Within this overall picture, of course, the nature of today's oil business means that there will be price fluctuations — often quite sharp — on a daily, and even hourly, scale. There will always be the possibility of a significant, more permanent fluctuation, but a likely profile into the 1990s is the oil price 'roller

Figure 1: Energy Consumption (excluding Communist Areas)

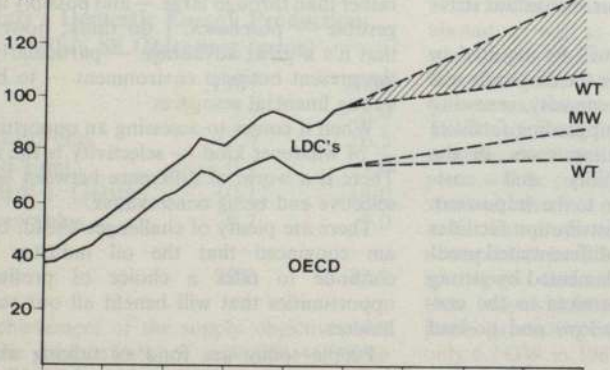


Figure 2: OPEC Production, Exports and Revenues

	Population* (million)	Crude/NGL Production 1987 (million b/d)	Oil Exports 1987 (million b/d)	Revenues ($ billion) 1987	Revenues ($ billion) 1980	Revenues ($/capita) 1987	Revenues ($/capita) 1980
THE GULF							
Saudi Arabia (+ ½ N. Zone)	11	4.6	3.8	23	106	2090	11500
Iran	45	2.4	1.6	10	13	220	340
Iraq	6	2.1	1.8	11	26	690	2000
Kuwait (+ ½ N. Zone)	1.7	1.4	1.2	7	18	4100	12900
UAE	1.3	1.7	1.5	9	19	6900	19000
Qatar	0.3	0.3	0.3	2	5	6700	23500
THE OTHERS							
Libya	3.8	1.0	0.9	6	21	1580	7200
Algeria	22	1.1	0.9	5	13	230	680
Nigeria	100	1.3	1.1	8	25	80	300
Gabon	1.1	0.2	0.2	1	2	910	1600
Venezuela	17	1.9	1.5	9	18	530	1200
Ecuador	9	0.2	0.1	1	1	110	125
Indonesia	163	1.3	0.8	5	13	30	90
TOTAL	392	19.5	15.7	97	280	250	825

* (Latest available)

Figure 3: USA Domestic Crude Production and Net Oil Imports

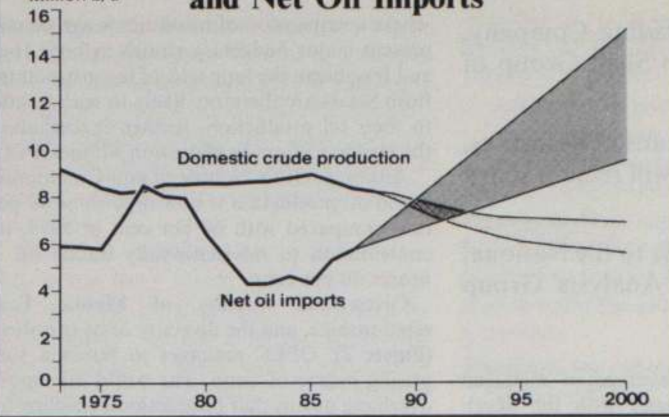
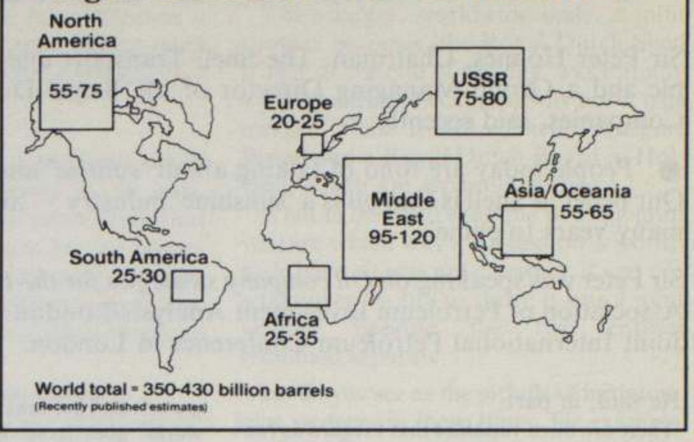


Figure 4: Potential New Oil Discoveries



coastering' between say $12 and $20 in today's money. Later in the 1990s there could be the possibility of steady price increases, but not on the dramatic scale of the 1970s.

The structural development of the industry was shaped by the characteristics of oil: it is difficult to find; of limited use as found; found in places far removed from the main consuming areas; and consumed in huge quantities. Oil will remain by far the world's major energy source well into the next century, unrivalled as a source of transportation fuels, lubricants and bitumen. Gas volumes will grow, as its qualities suit it for a wide range of applications.

Despite innovation and cost-cutting, oil and gas projects remain technically complex, international and capital-intensive, with long lead times. Take the Troll gasfield offshore Norway as an example. This was discovered in 1979, but gas deliveries will not start until 1996. Plateau production is scheduled for 2002 — almost a quarter of a century after discovery.

The nature of the oil cycle will also endure: find, develop, transport, refine, market — and then reinvest. Those companies that want to remain leaders must remain committed to all five of these separate industries that we summarise as 'oil'.

Successful companies will also try to ensure that their earnings are well distributed geographically. Overdependence on individual upstream projects or particular markets is obviously a potential source of vulnerability.

Upstream

Any company committed to the upstream oil and gas business must aim at least to replace the oil and gas it produces each year. It will do this by a judicious balance of finding — at as low a cost as possible — new reserves, upgrading existing reserves, and buying properties. It is generally felt that the opportunities for finding huge new fields are slim. However, even in the mature areas plenty of opportunities remain — for example, the industry in the US expects to find as much oil in the next 20 years as it has done in the previous 20. So I do believe that there are good possibilities of further discoveries elsewhere in the world, which are virtually unexplored in comparison **(Figure 4)**.

A recent US study noted that their greater financial resources allow the larger companies to drill where the risks are high and the rewards correspondingly large. The result is that they find a correspondingly greater share of new oil and gas reserves.

On the production side, the successful company must squeeze as much oil as it can from existing fields. Even with oil prices at relatively low levels, enhanced oil recovery will be increasingly important — this already accounts for 58 per cent of Shell Oil production in the USA.

Other players have a role to play in assisting in the development of the upstream oil and gas business through the 1990s — notably governments, through fiscal relaxation. In the North Sea, for example, the tax burden has fallen very significantly since the 1986 oil price fall, and this has been an important factor in maintaining offshore momentum. In many areas of the world, the upstream business often involves joint ventures with governments. This gives host governments an increased appreciation of the realities of the business.

Another problem in many developing countries is that national debts inhibit banks from providing the finance for new ventures — ironically, the very ventures that would help these countries improve their debt position. The need is to separate the project risk from the country risk.

Downstream

The 1990s promise strong competition, and the structure of the industry will continue to change as OPEC members and other producers extend their operations to provide security of offtake. It is clear that tough, competitive conditions will persist whoever the players are, and the only response to this is constant striving for efficiency.

Further rationalisation will be required in the refining business, where the emphasis will be on dismantling surplus capacity, renewing older less efficient plants, upgrading facilities and reducing fixed operating costs. In the marine business, flexibility and cost-effectiveness will continue to be important. Continued upgrading of distribution facilities and retail outlets and new, differentiated products will need to be complemented by strong emphasis on improving services to the customer. The trend towards low- and no-lead fuels will continue.

In the trading world, the major oil companies have already shown the ability to flourish in competition with the best specialist traders.

A major event in Europe in the coming decade will be the Single European Act.

The impact is likely to be felt in two main areas — product specifications harmonised through environmental protection legislation, and indirect taxation. Harmonising VAT and excise duty may have significant effects on the pricing of, and hence the balance of demand for, transportation fuels, for example.

Petrochemicals deserve special mention.

Although petrochemicals will remain a cyclical industry, a clearer understanding of the nature of demand could help to banish the spectre of a return to the overcapacity of the past.

So far, producers appear to be taking a responsible attitude. If this continues, then I believe that the future for petrochemicals remains good, particularly for producers with access to competitive feedstock supplies. A strong petrochemicals arm will be important for the successful oil company in the 1990s.

Restructuring in the industry

I am sure that the business environment I have mapped out will mean that further restructuring within the industry is inevitable.

The track record of oil companies' diversification efforts has not been good; nevertheless, the development of trading activities has demonstrated their adaptability, and the successful oil company will remain on the alert for potential opportunities to move into new areas of business. My own view is that these are best developed along 'learning curves', rather than through large — and possibly indigestible — purchases. I do think, however, that it's a great advantage — particularly in the present business environment — to have strong financial resources.

When it comes to assessing an opportunity — of whatever kind — selectivity is the key. There is a world of difference between being selective and being conservative.

There are plenty of challenges ahead, but I am convinced that the oil industry will continue to offer a choice of profitable opportunities that will benefit all our stakeholders.

People today are fond of talking about 'sunrise' and 'sunset' industries. Our belief in Shell is that oil is a 'sunshine' industry — and will remain so for many years to come'. ●

Italy's new energy plan: no nuclear, but more gas and coal

Silvia Pariente-David, Director of International Energy Services, DRI Energy

After several months of preparation and numerous delays, a draft of a new *National Energy Plan* for Italy has been released. The plan was presented on 8 July to Prime Minister De Mita by Industry Minister Battaglia. Italian energy policy had been left in suspense since June 1986 when, following the Chernobyl accident, Parliament froze the implementation of the previous energy plan (PEN 85), adopted in December 1985, and called for a national energy conference to review the objectives of PEN 85, with particular regard to the development of nuclear power. The national energy conference was held in February 1987. In response to mounting public opposition to nuclear power, a referendum was held in November 1987.

Although the responses to the referendum do not necessarily imply a nuclear moratorium, they indicated that an overwhelming majority of Italians were opposed to nuclear power. Plans to build further nuclear plants were suspended, work on one of the plants under construction was halted, existing plants, which had not been operating for several months, remained closed and work on a new energy plan started. Although a draft was initially scheduled for March 1988, a change of government delayed the work.

The new plan (PEN 88) has to be examined by the government but, given its uncontroversial nature, it is unlikely to encounter opposition at the cabinet level. A parliamentary debate will follow in the Fall and, if no change is required, the new PEN might be ready for implementation in early 1989.

Reducing Italy's dependence on oil and on energy imports — from currently 81 per cent of energy requirements to 24 per cent in 2000 — remain the central points. The main objectives of the plan are to:

- achieve energy savings of 10 mtoe, through improvements in energy efficiency in all sectors, rational use of energy in energy-intensive sectors, development of cogeneration and district heating systems;
- reduce atmospheric pollution, especially from electric power plants;
- develop domestic energy supplies;
- diversify energy supplies.

The plan is particularly ambitious as regards the contribution of indigenous energy sources in meeting the country's energy requirements. Oil production should double, while renewable energy supplies should increase tenfold.

Italy's Domestic Energy Production: PEN 88 Objectives (mtoe)

	1987	2000
Oil	3.9	8.0
Natural Gas	13.4	16.5
Solid Fuel	0.3	1.0
Hydro + Geoth.	10.1	14.0
Renewables	0.3	3.0
Total	28.0	42.5

Achievement of the supply objectives will require investments of L 40,000–46,000 bn ($29–34 bn) over the next 12 years.

The main differences with PEN 85 are:

- a slower reduction in **oil** consumption and oil dependency;
- exclusion of **nuclear** power;
- a less ambitious objective for **coal** penetration, as the siting of coal-fired power plants is proving increasingly difficult because of local opposition;
- increased contribution from **natural gas**, especially in the power sector;
- more ambitious objectives for energy conservation and **renewables**.

Supply diversification in the power sector is critical to the achievement of the PEN's objectives and will be particularly difficult to implement, now that nuclear power is excluded. The plan assumes strong growth in electricity demand from 210 TWh in 1987 to 315 TWh in 2000, but only 290 TWh in a low growth scenario, i.e. 3.2 per cent p.a. in the base case and 2.5 per cent p.a. in the low growth scenario. This compares with DRI's forecast of 283 TWh in 2000, i.e. growth of slightly over 2 per cent p.a. No details are available on the plan's assumptions regarding electricity demand but the figure of 315 TWh in 2000 is the same one used in the state electricity corporation (ENEL) latest plan. The differences between ENEL's and DRI's forecasts of electricity demand in 2000 are due to:

- stronger economic growth assumed by ENEL (GDP growth of 2.5 per cent p.a. vs. DRI's forecast of slightly over 2 per cent p.a.);
- stronger penetration of electricity in ENEL's scenario in all end-use sectors, but especially in the domestic sector because of wider use of air conditioning in commercial buildings.

There will be no contribution from nuclear power to electricity generation until 2000. The decision on the future of nuclear power could be revised in 5 years time, if studies in Italy and abroad, as well as experience in other countries, prove that it is a safe solution. In the meantime, the existing Latina, Trino and Caorso nuclear plants are permanently closed. The Montalto di Castro nuclear plant, which is under construction and 75 per cent complete, will be redesigned as a multi-fired conventional thermal power plant.

If the projected growth in electricity demand is to be met without excessive reliance on imports and on oil/gas fired generation, then Italy will have to expand its coal-fired power generating capacity which amounted to only 6.9 GW in 1987.

Oil and gas have covered 52 per cent of power generating requirements in recent years and even more in 1987 when the gap left by nuclear power was met by increased oil and gas burn in power plants. PEN is looking to coal to reduce the role of hydrocarbons in the power generating sector. To avoid public opposition to coal-fired stations, ENEL will be building multi-fired power plants. Nevertheless, the consumption of solid fuels in power plants is expected to double by 1995 and triple by 2000, from the 1987 level of 7 mtoe. PEN also contains proposals to facilitate siting of power plants and accelerate planning procedures.

Whereas natural gas use for electricity production was initially considered as a temporary expedient, PEN 88 now envisages a doubling of gas consumption in the power generating sector between 1987 and 1995 and a tripling between 1987 and 2000.

Reliance on oil remains high

Even under the most favourable scenario, Italy's dependence on oil remains close to 50 per cent (the new PEN's objective is 46 per cent in 2000, compared to an objective of 44 per cent in 1995 in PEN 85). DRI and Unione Petrolifera forecast the share of oil at 49 per cent–50 per cent in 2000, although a bigger role for natural gas in the power generating sector, as assumed by PEN 88, could reduce the overall share of oil to 45 per cent or less. However, oil consumption should not increase further from its current level of 91–92 mtoe.

In DRI's forecast, oil consumption is expected to decline steadily in the power generating sector. After a temporary period of stagnation, it is also projected to decline in the industrial and domestic sectors.

Demand in the transportation sector is forecast to continue growing. Growth in gasoline consumption should be moderate at 0.7 per cent p.a. between 1987 and 2000. However, reduction of excise duties on gasoline, as required by the EC directive on tax harmonisation, could boost growth to 1 per cent p.a. in the mid 1990s. Diesel consumption has been growing strongly in recent years. Growth should remain strong in the late 1980s — early 1990s but might be dampened in the mid-1990s by the tax harmonisation that would reduce the price advantage of diesel over gasoline in Italy. The penetration of diesel in road transportation, at 51 per cent, is the highest in Europe and is expected to increase further. However, the share of diesel in road transportation is lower in the mid-1990s with tax harmonisation than without tax harmonisation.

The share of middle distillates in Italian oil demand is increasingly dominant. However, the share of light products stops falling in the mid-1990s because of the tax adjustments required by the completion of the single European market.

Italy's refining capacity was 128 million tonnes at the beginning of the year, a reduction of 26 per cent compared to the peak of 172

Table 1

Primary Energy Requirements

	1987(p)		PEN 85 1995		PEN 88 2000		DRI Forecast* 2000	
	mtoe	%	mtoe	%	mtoe	%	mtoe	%
Solid Fuels	14.6	9.6	33–36	20.4	29	16.4	25	14.5
Natural Gas	31.7	20.8	33–35	20.1	50	28.2	41	23.6
Oil	91.1	59.7	70–80	44.4	81	45.8	87	49.7
Nuclear	0.0	0.0	7–9	4.7	0	0.0	0	0.0
Hydro + Geoth.	10.1	6.6	12–13	7.4	14	7.9	14	8.0
El. Imports	5.1	3.3	3–7	2.9	3	1.7	7	4.2
Renewables	0.3		1		3			
Total	152.9		164–178		180		175	

(p) provisional

Table 2

Structure of Italian Oil Demand (% of Total Oil Consumption)

	1975	1986	1987	1990	1995	2000
Light Products	19.8	22.9	22.3	22.5	23.5	24.1
Middle Distillates	28.7	35.8	34.8	35.8	37.8	39.0
Heavy Fuel Oil	47.3	31.4	33.2	31.5	28.1	25.5
Other	4.2	9.9	9.7	10.2	10.6	11.4

Source:
DRI European Energy Forecast Report, June 1988

(p) provisional

million tonnes reached in 1979. However, the average utilisation rate of Italian refineries remains low. Refinery throughputs declined in 1987 despite higher oil consumption, because of increased imports of finished products, and the refinery utilisation rate was only 65 per cent, compared to 67 per cent in 1986 — when netback deals boosted crude throughputs in Italy — and an EEC average of 79 per cent in 1987. Even if throughputs increase slightly from their low level of 1987, utilisation rates are unlikely to exceed 70 per cent unless there are further refinery closures. In addition, the Italian oil industry is not well equipped to deal with the projected change in the structure of oil demand. With a ratio of conversion capacity to primary distillation capacity of 21 per cent, Italy has one of the least sophisticated refining industries in Western Europe (the average ratio in the EEC is 24 per cent).

PEN 88 recognises the need to rationalise the Italian oil refining and marketing sector. The Italian private oil industry has been blaming the price control system for its financial losses. However, despite repeated demands from the industry, PEN proposes to keep in place the 'prezzi sorvegliati' system that governs the pricing of petroleum products.

Additional import contracts needed to meet growing gas demand

Despite the upward revision in future indigenous gas production, Italy will have to import increasing volumes of natural gas to satisfy the PEN gas consumption objective. The PEN objectives call for imports of 39 bcm/yr in 2000, compared to imports of 21 bcm in 1987.

Current contracts cover imports of 29 bcm in the 1990s: 12 bcm from Algeria, 13 bcm from the Soviet Union and 4 bcm from the Netherlands. Under PEN 88, Italy will have to contract for additional import volumes (10 bcm) by the end of the century but this should not prove a problem.

Italy imports small volumes of LNG from Libya and has the capacity to import 3 bcm/yr of LNG in total. The Transmed pipeline between Algeria and Italy has a capacity of 12 bcm, which should be fully used in 2–3 years when contracted deliveries are fully lifted every year, but this capacity could be upgraded to around 18 bcm/yr through the use of additional compressors. Italy could negotiate additional deliveries from the Soviet Union and transportation capacity should not be a problem. Current contracts between the Soviet Union and Western European countries call for deliveries of 57 bcm/yr in 2000 and, without laying additional pipelines, transportation capacity between the Soviet Union and Western Europe could be increased to nearly 80 bcm/yr. Although less likely, Italy could obtain additional volumes from the Netherlands.

Another possible source of supply is Norway. Italy does not presently buy gas from Norway and is not on the list of Troll buyers. However, if Italy is not satisfied with the pricing terms offered by Algeria and wishes to limit Soviet volumes in order to diversify supplies, it could obtain Norwegian gas through Germany and Switzerland. ●

Petroleum Review Index

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Singapore broadens its economic base

By Paul McDonald

Singaporeans are finding that they have to be increasingly adaptable in order to retain their position as the Far East's principal export refining centre. At the same time, they are trying to broaden their economic base by expanding Singapore's trading functions.

Deregulation of oil markets in the Pacific provides the city state with a number of new trading and marketing opportunities, but Singaporeans may also find themselves having to fight off strong competition from both the Far East and the Middle East.

Refining centre

For nearly 30 years, Singapore has been an important export refiner for the region east of Suez and, for about half that period, oilmen have been forecasting its demise. The 1980s, in particular, have been marked by rising gloom about the island's entrepôt refining function as world oil demand fell from its 1979 peak and newer, more sophisticated refining centres grew up to challenge the dominance of Singapore.

Singapore, like the Mediterranean and Caribbean, operates as a swing refiner. As such, it is vulnerable both to seasonal falls in demand in the Far East and to the growth of domestic processing of crude oil in many of its former markets.

Singapore's five refiners **(Table)** can count on a baseload of around 525,000 b/d, about one third of which is term processing and the rest own account processing for overseas affiliates. This leaves some 175,000 b/d of spot processing for a range of customers from the Persian Gulf to the Pacific.

All three types of businesses, however, are vulnerable to growing competition in the region. Traditional customers like Iran and India have begun to buy a large proportion of their refined product imports from the Middle East and Mediterranean, and Indonesia, formerly Singapore's largest customer, has been cutting back on processing there since 1983, following the growth of its own refining sector. Term processing ended altogether in 1986.

Singapore's other two main term customers, Malaysia and China, are also planning to cut their overseas processing. Malaysian processing is particularly important, given its proximity to Singapore and the shortage of refining capacity inside Malaysia. The state oil company, Petronas, has term agreements with BP, Shell Eastern and Singapore Petroleum Company (SPC) for up to 60,000 b/d of term processing. Petronas however, has plans for a 100,000 b/d refinery at Malacca, which is due on stream by 1991, after which time term processing will presumably cease.

Sinochem of China, Singapore's other main term processing customer, also intends to phase out overseas processing by about 1990. China's domestic refining system, however, is unlikely to be able to supply the country with all its product needs by the early 1990s and Sinochem looks like being a significant processor, probably throughout the next decade.

New markets

Singapore, nonetheless, must continue to find new markets. In the short term, both Thailand and South Korea are experiencing rapid growth in refined product demand, which Singapore is well able to supply. Decontrol of the Japanese market should provide new opportunities, as should the newly deregulated Australian market. Vietnam is also developing as both a producer and consumer of oil and is another natural market, particularly now that Hanoi is showing signs of wanting to end its dependence on the Soviet Union for imports and to trade more with its South East Asian neighbours.

In the longer term, however, none of these markets may be regarded as secure. Thailand and South Korea, for example, both have ambitious refinery building and upgrading programmes.

Korea, in fact, could even begin to challenge Singapore for Asian processing business, if the government in Seoul goes ahead with plans to liberalise the domestic oil sector. Refiners currently benefit from price controls and tax concessions that protect profit margins in the home market. Now, the government is proposing to remove some of the protection that domestic refiners enjoy and some of them may be tempted to look for third party processing deals as a new source of profit. Given the proximity of its main producing areas of Daqing and Shengli, China would be an obvious target for such a move.

The liberalisation of the Japanese market could also pose a problem as well as providing an opportunity for Singapore's refiners. Whereas many Singaporeans expect to be able to increase their exports to Japan as decontrol continues there, it is also possible that the liberalisation of the Japanese refining sector will be followed by the growth of export refining in Japan as refiners here also look for new marketing opportunities outside their increasingly competitive home markets.

Refinery upgrading

Singapore refiners nevertheless are exhibiting a good deal of confidence in the face of increasing local competition. Since the summer of 1987, they have announced a number of upgrading schemes including:

- a 30,000 b/d catalytic cracker by Shell for completion by late 1989
- a 50,000 b/d visbreaker for the Esso refinery, due also to be completed late 1989
- a 23,000 b/d hydrocracker for Mobil, which is also planning to expand its catalytic reforming capacity from 14,000 to 19,000 b/d.

More distillate

The upgrading schemes are Singapore's response to the lighter consumption pattern that is developing in the Far East. Although demand for gasoline is rising in the Pacific region, middle distillate looks like being the more important market for a number of years to come.

Gasoline consumption in East Asia and Australasia is running at around 1.25 mbd at present, compared with gas oil consumption of just under 1.75 mbd, although there are regional variations. Middle distillate forms Japan's main product demand group at almost one third of total consumption whereas, in Australasia, middle distillate, though still around a third of the product demand slate, comes second to gasoline, which accounts for nearly 42 per cent of total consumption.

Jet fuel is another growth market, given Singapore's rising importance as a regional airline hub. There is growing demand from Japan, Korea and Australia at present with further growth expected from Hong Kong and Taiwan. Japan is also a major consumer of jet kerosine for heating.

This pattern of high middle distillate use should help Singapore's refiners whose crude oil slate is heavier than in many of the world's major refining centres. Most of the island's top oil suppliers produce crude with medium to heavy refined products yield. Last year, Singapore's top five crude oil suppliers were Malaysia, Saudi Arabia, China, Kuwait and Indonesia.

The actual proportion of short haul to Middle Eastern crudes depends both on price and local product demand. Inflexible pricing policies on the part of some OPEC countries have restricted imports in the past, especially from the Persian Gulf. Netback pricing in 1986, however, led to a substantial rise in deliveries from countries like Kuwait, Iran and Qatar, whose netback formulae were particularly favourable to Singapore refiners.

This year, refiners have complained of inflexible pricing from short haul producers like Indonesia. Rising demand for middle distillate, on the other hand, has occasionally prompted them to switch from Persian Gulf to local crude both to increase distillate yields and to cut sulphur levels.

Middle Eastern competition

Singapore has already lost some of its business to the newer refiners of the Middle East. A new threat now appears to be looming in the shape of the 325,000 b/d Rabigh refinery in Saudi Arabia. If this long delayed scheme finally comes on stream next year as planned, some 200,000 b/d of heavy fuel oil could be available from the refinery. With the large amounts of fuel oil available from both Singapore and the US West Coast, Singapore refiners may soon have cause to be thankful that they recently decided to upgrade their plants to take more atmospheric residue.

Trading expands

As a major refining centre and the break of bulk point for a good deal of the oil entering the Pacific region from the West, Singapore is increasingly involved in oil trading. A local forward market already exists in naphtha and local traders are interested in expanding their activities into fuel oil and perhaps also gas oil.

The Singapore International Monetary Exchange is now examining the idea of introducing a formally regulated futures contract for fuel oil. The island is already a major bunkering centre with sales of about 160,000 b/d and consumes a further 45,000 b/d of heavy fuel oil as power station fuel.

Forward trading in Singapore is unlikely, however, to reach the same level as in the other principal centres: London, New York and Houston. In the first place, there is no local, widely traded crude oil like Brent or West Texas Intermediate to act as a regional marker. There is an active forward market in Dubai's Fateh crude, but this does not provide a particularly effective hedging mechanism for local, short haul crudes.

In order to achieve an acceptable level of liquidity, any futures or forward contract really needs to appeal to Japanese as well as to Singapore traders and this may be a problem where Singapore and Japan use different product specifications. In the longer term, however, local refiners may seek a return to long term supply arrangements as a protection against volatile prices.

Downstream ventures between producers and consumers are in their infancy at present and largely confined to the Atlantic Basin. With the growing liberalisation of East Asian markets, refiners there may begin to explore long term supply links with producers, particularly those in the Middle East.

So far, there have been few signs of interest from the main, protected oil markets of the region.

Decontrol is likely to be accompanied by a growing interest in long term refining and supply ventures, given East Asia's high level of dependence on oil imports.

In that case, even the refiners of Singapore may have to join their neighbours in entering into joint ventures with the producers of the Middle East simply in order to ensure that they continue to be competitive in the rapidly changing Pacific region.●

Singapore's refining sector

	Refinery capacity (b/d)
BP	
(Pasir Panjang)	**28,000**
Esso	
(Pulau Ayer Chawan)	**176,000**
Mobil	
(Jurong)	**193,000**
Shell Eastern	
(Pulau Bukom)	**300,000**
Singapore Refining Co.*	
(Pulau Merlimau)	**161,000**
TOTAL	**858,000**

Source: Oil & Gas Journal, 28th December, 1987

*a joint processing refinery formed in 1979 by Singapore Petroleum Co., BP and Caltex.

CONFERENCES AND MEETINGS 1988 AND 1989

1988	
September 13–16	3rd International Conference on Stability and Handling of Liquid Fuels
September 28, 29, 30	Oil Industry Nurses Symposium
October 18	Documentation Control in the Energy Industries
October 21	The Institute of Petroleum 75th Anniversary Luncheon Meeting
October 27	North Sea Oil and Gas Beyond 2000?
November 1	Management Development Workshop
November 2	Oil Supply and Price – 'A New Supply Map?'
November 17, 18	The Third Oil Loss Control Conference — Product Handling and Distribution
November 23	1992 The Single Europe Act The Business Implications for Downstream Oil and Gas
1989	
February 14	Luncheon Meeting
February 15	Annual Dinner
February 16	Luncheon Meeting
April 12	Economics of Refining
June 28, 29, 30	Introduction to Oil Industry Operations
July 3, 4, 5	Introduction to Petroleum Economics

For further information, please contact:

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London W1M 8AR, UK
Telephone: 01-636 1004 **Telex: 264380** **Fax: 01-255 1472**

IP ENERGY ECONOMICS GROUP

The following meeting has been arranged:

Tuesday, 11th October

'The Forward Paper Market for Russian Gas Oil'

The speaker will be:

Mr David Long of the Oxford Institute for Energy Studies.

Venue and time:
Institute of Petroleum. 5.00 for 5.30 pm

All interested parties are welcome to attend

Please contact Miss Susan Ashton, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: 01-636 1004

The Tallow Chandlers Company brightens old links

The Worshipful Company of Tallow Chandlers, a City of London Livery Company which received its first Royal Charter in 1456, has recently forged links with two major British energy companies. The Company provides a variety of awards to outstanding young employees of BP and British Gas.

To understand the connection we need to go back a few years — almost six hundred in fact. The Tallow Chandlers Company was responsible for maintaining the standard of tallow candles in the Middle Ages. Only the church, the crown and the very rich could afford beeswax candles — the rest of us were obliged to use candles made from tallow, which is the purified fat of sheep and cattle.

In 1404, the City of London made a first spluttering attempt at street lighting when inhabitants were ordered to hang out 'lanthorns' with candles 'lit to burn as long as they will last'. The wily burghers, who realised that light was money, restricted this order to nights when the moon was dark. Over the centuries, candles for both interior and exterior lighting were replaced by first oil and later gas. A pamphlet detailing the Company's history notes the irony: "It is true that the oil lamp might have caused our downfall when London ceased to be lit by the tallow candle."

Colonel Michael Woodhead, a robustly good-humoured man who is Clerk to the Company, explained that the new links between the Tallow Chandlers and their successors had worked wonderfully well. "We were becoming a moribund organisation but in the mid-1970s we approached Sir David Steel, then Chairman of the British Petroleum Co., and suggested that we award certificates and medals to BP apprentices as a reward for excellence.

"That's gone from strength to strength — except that as apprentice numbers have dwindled, we have moved on to other fields. We approached BP's Sunbury research establishment in 1983 and they thought it would be a good idea to do the same thing for young scientists.

"The young scientist has to produce a paper about what he's been working on for the past three months and that's presented in front of his superiors, his peers and an assessor from the Tallow Chandlers, who is a layman. This year we're also looking at young people who provide technical support at Sunbury. We also present a medal at Dyce, which is BP's training centre for offshore activities, and we're also looking at awards in distribution."

The awards are made at a special annual lunch at the Tallow Chandlers' magnificent Company Hall on Dowgate Hill adjacent to Cannon Street railway station. For many award-winners, it is their first time in London. But during the ceremony it is likely that any nervousness felt by recipients will be matched by that of the person presenting the awards. The presentation is one of the first official outings of the new Lady Mayoress.

"The awards reward achievement," explained Colonel Woodhead. "We finance them as a charity. The winners come for a presentation along with their parents or friends and lunch afterwards with the Chairman Sir Peter Walters or his Deputy. In due course, prize winners could become members of the Company.

The Livery Company's connection with British Gas began in 1982. All 13 regions of British Gas compete for medals and certificates. First made in 1984, the awards cover a number of categories, including one for the employee who has made most exceptional progress — especially over physical disability. Last year a blind computer programmer won it. British Gas Chairman Sir Denis Rooke attends the presentations.

In recognition of the new links between the Company and the energy industry, Sir Denis Rooke together with Sir David Steel and Sir Peter Walters have all been made Honorary Freemen of the Tallow Chandlers Company. This is their highest accolade, usually restricted to royalty.

And this year a former oilman has been made Master of the Company. Sir Christopher Laidlaw, who was Managing Director of British Petroleum Ltd when the award scheme started and later became Deputy Chairman, is now Chairman of Bridon PLC.

Resulting from another branch of their old craft, the Tallow Chandlers' Company has numerous connections with the edible oil trades. Leading industry figures are given the Freedom of the Company. The Australian High Commission is a member (no surprise as the country is a major exporter of tallow). An interesting body called the Average Market Letter Committee meets in the Company's Hall in order to determine tallow prices and, among other charities, the Company pro-

The Tallow Chandlers' Grant of Arms, written in Norman French and featuring an angel bearing the head of St John the Baptist on a plate, dates from 1456 and is the oldest operative Grant in existence to any Livery Company.

Sir Peter Walters, Sir David Steel and Sir Denis Rooke have been made Honorary Freemen of the Company. It is the top honour that the Tallow Chandlers can bestow.

vides pensions for 'poor persons whose claims are sponsored by the Oilseed, Oil and Feedingstuffs Benevolent Association.'

There are three progressively smaller tiers for the 200 members in the Tallow Chandlers Company — Freemen, Liverymen and the Court of Assistance. "It is the rule that those selected for the Court will go forward to become Master — most do," said Colonel Woodhead. "They often take the chair in the year that they'll be retiring from full-time business. It's quite a busy job with often a daily, certainly a weekly involvement. As Clerk, I'm like Sir Humphrey and the cry of 'Yes, Master, but...' echoes through the Hall."

Today the function of the Tallow Chandlers' Company is partly social and partly charitable. Each year the 100 or so City of London Livery Companies raise somewhere between £9–15m for charity, most of it going into education or trade. Some 77 ancient Livery Companies survived until the First World War and they have since been joined by 17 new companies representing, in the main, specialist professional interests. Many companies have extended into new areas. The Apothecaries Society, which has a beautiful hall near Blackfriars Station, has shed its connection with chemists and now grants diplomas to physicians and surgeons. Others continue old traditions. The Goldsmiths Company have responsibility for assessing the metal content in coins of the realm. The Wax Chandlers, founded in 1330 and responsible for production of beeswax candles, maintains close connections with the British Bee Keepers' Association.

Colonel Woodhead stressed the difference between craft companies, such as the Tallow Chandlers, and the wealthy merchant companies, known as the 'Great 12' which included Taylors, Goldsmiths and the like. "Although we started life as chandlers — selling candles and other items — eventually we emerged as ombudsmen for tallow chandler workers. We were responsible for tallow standards, hours of work, duties. We became middle class — and that's how the class system started. We're tradesmen with a tradesman's approach to life. Our links with BP and British Gas has given us a new interest in trade, which is where we started."

In its early days the Company's officers, who were saddled with the unwieldy title of 'the Wardyns of the Craft of Taloughchaundlers' were responsible for searching out those who made candles 'disceyvably with grece' or who made wicks of 'threde and flox' rather than clean cotton. But their work extended well beyond candles. For some curious reason the Tallow Chandlers trade went hand-in-hand with the sale of vinegar and sauces and these also were given the once-over by the Company's men. Products not meeting prescribed standards were promptly tipped in the gutter. In later years they came to exercise some authority over the production of soap and the sale of lighting oil.

Colonel Woodhead explained why the Tallow Chandlers maintained old traditions and rights. "We still encourage members to exercise their civil rights to be present at the elections for the Lord Mayors and Sheriffs of London. If they don't attend, there isn't much point in being a member. Outside London, none have retained any civil rights. If we don't maintain our privileges, people will take them away. This is a serious point — if our civil rights are taken away we couldn't have any guarantee of retaining the land we sit on."

This is indeed a prime site, worth considerably more than the £166–13s–4d that the Company paid for it in 1476. The first hall built there was destroyed during the Great Fire of London on the evening of Sunday, 2 September 1666. Its replacement was built within four years and includes a courtyard with fountain and one of the largest and most elegant banqueting halls of any City Livery Company.

There is beautiful woodwork throughout the building, particularly in the Courtroom (the equivalent of a modern boardroom) where wainscotting was supplied for the not inconsiderable sum of eight shillings a yard.

In fact British Petroleum has another connection with the ancient craft of candle-making. Its UK subsidiary BP Oil is a sponsor of the Ironbridge Gorge Museum which includes a working tallow candle factory on its Blists Hill site. This impressive development aims to recreate life in a Midlands town at around 1900. The candles, which can be bought by visitors, are produced by repeatedly dipping cotton wicks into a vat of molten tallow. Museum guides dressed in period costume create a *frisson* among younger visitors by explaining that the tallow was made by rendering down carcasses which were kept upstairs in the small factory. "You can imagine the smell," they point out. Nowadays, paraffin wax is used for candle-making at Blists Hill.

When Colonel Woodhead rang up a supplier to obtain a sample of edible tallow recently, the response was "Would you like one tankerload or two?" He replied by pointing out the problem of parking in Dowgate Hill and, in any case, a small jar would do. It turns out to be greyish-white with a not unpleasant, slightly meaty smell. The Clerk to the Tallow Chandlers was pleased to announce that he had found a new use for the material which was the mainstay of his Company over the centuries. "Our steel gates used to get jammed solid. Visitors used to knock on my window — I'd point at the gate and they'd shrug their shoulders. In desperation I reached for the tallow jar and, lo and behold, now the gates swing free and easy." ●

Christopher Hirst

Proven reserves: dwindling human resources

By Jeremy Nicholls, Education Adviser, The British Petroleum Company plc.

UK 'proven reserves' of school leavers and university graduates available for industry recruitment in the 1990's are moving sharply downward. This is because 1995 is round about the bottom of the demographic trough, the year in which the numbers in the 18 to 19 year old age group entering higher education or the labour market will have fallen by virtually one-third from their peak in 1982. The exact figures are worth noting: 1.872m 18 and 19 year olds in 1982, down to 1.243m in 1995. After that, the numbers start recovering, but the recovery is steady rather than dramatic. At the turn of the century there will still be around 300,000 fewer 18 and 19 year olds than there are today; almost exactly half a million fewer than there were in 1982.

It is important to remember that we are not only talking about a trough in the birth rate but also about the baby boom which preceded it which is now working its way into the adult population. At the beginning of the '70s there were just under 2.9m young people aged 16 to 19 in Great Britain. By 1983 the figure had swelled to 3.7m and by the mid '90s will have dropped to around 2.5m. Such dramatic changes in the age structure of the population pose significant problems for society, for the major demand-led public services such as education, health and social services, and for employers.

However, these stark national totals conceal marked regional and social variations. Broadly speaking, the birthrate fell most sharply among social classes IV and V; least among the skilled, professional and managerial groups (whose children are most likely to stay on at school and go on to higher education). Similarly, the decline in numbers will be least noticeable in the economically strong south east; most marked in the north.

Skill shortage are said to have constrained industrial growth throughout the recession and recovery of the '80s, in a period when unemployment has been at record levels. The problem is that the long-term unemployed don't have the right skills and generally speaking, are living and seeking work in the *wrong* places. Hence the concern to reinvigorate the more flexible private rented housing sector and to instill the habit of training, eg a family manufacturing business, operating out of a small industrial estate in West London, can't recruit, let alone retain, skilled carpenters and fitters. 'If you could offer accommodation, of course', says the local Job Centre, 'we could send you any number of experienced applicants.'

Another myth is that the labour force is shrinking as a consequence of the demographic decline. It isn't. It's just that its composition is changing: more older people, more women, more part-timers. According to the March 1988 edition of the Employment Gazette, the civilian labour force of Great Britain aged 16 to 24 will fall from 6.12m in 1988 to 4.96m in 1995, but that aged 25 to 59 will grow from 19.9m to 21.8m, over the same period, a figure which includes one million more women in this age range than there are today.

How do they know? Well, of course, if the truth can be told, they don't. Registered births can be counted but economic activity rates can only be predicted. If the mood of the times were to favour a significant injection of public or private resources into building a thriving child-care industry, offering properly qualified and monitored after-school and holiday cover, as is common in Scandinavia and much of north west Europe, activity rates among women in the child-bearing years would be likely to rise steeply. Consider the age and sex distribution of the labour force in a country like Sweden and it's almost symmetrical. In the UK, the distribution is distorted into a sort of S-shape, with women mainly concentrated down at the younger end, in low pay, low reward jobs and men dominating in the middle-age band and in senior appointments.

So what can employers do to address these problems? The answer is, quite a lot, but it will take more effort and imagination than hitherto. One recipe would look something like the following:

- Study the supply side of the local, as well as the national labour market. To what extent will this national phenomenon affect you? Which parts of your organisation are likely to be affected most and, if you are considering relocation, where should you go to tap a plentiful supply of labour? Your local Employer Network should have the information.
- Look at your workforce. How many under-skilled young people have you already got on the payroll? People who opted out of school or college because the experience of their mothers, fathers and older brothers and sisters taught them all this education and training was so much eyewash, because there weren't any jobs at the end of it? What can you achieve through retraining and encouragement for self-development?
- How many women have you got and what are they doing? Women are, generally speaking, our greatest under-used resource. More complex, more conscientious, better organised and better communicators than many men. Often, they are locked by training and conditioned expectation into low-grade work, much of which could probably be done as well or better by machine. Then, just as they reach genuine adulthood, they start having babies. So flexible working hours, more genuinely part time jobs, career break schemes and company creches could convert a poor short-term investment into excellent long-term loyalty.
- Is your retirement policy right? How much could you achieve by offering your early retirers a way back as part-timers, short-term contract employees or private consultants?
- It is one of the great delusions of managerial thinking that problems require radical thinking, new insights and lots of bright-young-people. Often they don't.

The solutions are all there. People, today and yesterday, thought their way through to the ideas which will solve tomorrow's problems. All that is needed is the imagination to see that the time, for some of these ideas, has come.

JAPECs role in exploration training

JAPEC, the Joint Association for Petroleum Exploration Courses, was formed in 1980 to provide a specialised training service for the petroleum industry. It is a non-profit making organisation under the sponsorship of the Geological Society, the Petroleum Exploration Society of Great Britain and the Department of Geology at Imperial College.

The main activity of JAPEC is the arrangement of short courses to meet the specified needs of the oil and gas industries, complementing existing commercial course programmes on both general and specialised exploration and development related topics.

During the first seven years of its existence a total of 3,451 participants (of which 623 were academics paying a nominal fee) attended 63 courses, as illustrated by the following statistics:

	1981	1982	1983	1984	1985	1986	1987
Courses held	5	8	7	9	10	12	12
Registrations	539	433	497	531	723	540	278

JAPEC is run by a voluntary management committee made up of industrial, academic and independent members under the leadership of Professor R Stonely of Imperial College. The Association not only arranges short courses to meet the specific needs of industry, but fulfils its other purpose by distributing listings of all known courses relevant to petroleum exploration run in the UK.

A special contribution towards the field of education in petroleum exploration is JAPEC's selective admission of academics, mainly teaching staff, to most of its courses for a nominal fee, the objective being to improve the preparedness of college graduates for their working life in the industry.

Support from industry is vital, to ensure that JAPEC is in a position to continue to provide for the oil industry's future needs. Course calendars (issued in September for the following year) and detailed information are always available from the **Administrative Secretary, JAPEC, c/o the Geological Society, Burlington House, Piccadilly, London, W1V 0JU. Tel: 01-434 9944.**

Induction training in Shell — the importance of starting out right

Managers in Shell in the UK place considerable emphasis on induction training because of the long term benefits derived from giving new employees a sense of purpose and belonging. Induction training is carried out at different locations and at many levels. This article reviews a number of the programmes and their scope.

Personnel familiarisation

Shell Expro holds 'Know Your Company' courses regularly for new staff in London, with similar programmes at its two main operating centres in Aberdeen and Lowestoft.

Each group is a fair cross-section of the Shell working community: school-leavers in clerical jobs; graduates; supervisors in mid-career; some in middle management; some bringing their skill and expertise from companies other than Shell.

Over two days, senior managers will introduce participants to the functions and departments within Expro. A Cook's Tour of the organisation, supported by films, video programmes and slides, will take in exploration, petroleum engineering, surveying, computing, finance, supply, engineering and office safety, production, personnel and public affairs.

Shell UK's main accounting and computing centre at Wythenshawe, near Manchester, is one of the largest in Europe, employing nearly 600 people. Its personnel department runs a three-day induction programme, taking every recruit through an eight-point check list, covering every 'comfort factor' — from contracts of employment to staff councils, pay, overtime, pensions and sports facilities. A video, 'This is Shell UK', is followed by a briefing on the centre's operations and a comprehensive starter pack sets out information on the organisational structure and the centre's main activities. Next there is a tour of the building before they receive specific induction training relevant to the department they will be working in.

Specialised inductions

Familiarisation programmes aren't just for newcomers; people moving around the company, transferring their expertise to a new workplace, are also helped along the way.

Shell UK Oil's retail division, for instance, offers a window on its activities with a six-week course for those who will be working closely with sales and marketing personnel on the forecourts. They include specialists in property management, legal, estates and engineering.

Shell Expro, meanwhile, runs a six-day course for non-technical staff seeking a more in-depth exposition of its activities. It ends with a trip to Norfolk for a tour of the natural gas terminal at Bacton, followed by a flight offshore.

Graduate induction

After basic familiarisation with the workplace, the 90 or so graduates recruited into Shell UK each year, regardless of job or location, are given an early opportunity to meet the chairman and directors, on a two-day course which might well be called Know Your Own Management. They learn how the company functions and how it fulfills its role as a major energy producer, with more informal talks over lunch.

For graduate engineers joining Shell Expro, these welcome sessions are the start of an intensive 45-day introductory period, which takes in emergency response training, a week's tour of onshore and offshore installations, talks on hydrocarbon reservoir development, field and petroleum engineering and commercial skills development. This lays the foundation for a vocational and personal development programme which will last for four years.

Those graduates assigned to one of the main marketing divisions of Shell UK Oil — commercial (industrial, transportation and marine), automotive retail, lubricants, bitumen, LPG, or distribution — will spend some weeks learning about the structure of the organisation, as well as its products and marketing concepts. Visits are planned to terminals, service stations and the retail training centre at Coventry, Thornton Research Centre, Stanlow Refinery and the newly opened automated lubricants plant nearby.

In their first year, all graduates normally join with other colleagues, recruited in the Netherlands and other European operating companies, for a Group Orientation Course. This is held over five days in London and The Hague and is designed to provide an understanding of Shell's present and future roles in the business world. Presentations from the top tiers of management are interspersed with visits to plants, such as the Pernis refinery at Rotterdam.

School leavers

Two years ago the company began offering six places annually at its London head office for GCE A-level students, attracted through national advertising. Competition is tough with more than 500 applying for the places. When those selected join the company each September, they find a three-day induction programme mapped out for them.

'Right from the start we get them to meet the people they will relate to, so that they can understand where they fit in', explains Margaret Snell, Head of Recruitment. 'We bring in personnel advisers from each part of Shell UK to talk about the units they administer. Advice is then given on a host of issues, including health and safety, job evaluation, equal opportunities and other personnel policies, before we take them on a tour of the building.'

During their first year the new recruits can expect to move around in a variety of administrative roles, before being assigned to a permanent job. They are encouraged to pursue an HNC in business studies on a day release course at a college.

Youth training

Shell UK currently provides work experience for more than 200 school leavers through the two-year Youth Training Scheme. Apart from learning new skills in clerical, financial, computing and technical activities, which will boost their chances of securing a job, the participants undertake a period of college-based studies.

The Wythenshawe Accounting and Computing Centre, which takes on 30 young people each year, makes sure that they all start with three days of pre-induction, just before finishing school in July and two months before actually starting work. As managing agent for the scheme, Wythenshawe also looks after the training needs of six other trainees 'adopted' by Shell UK's materials centre at Wilmslow.

John Fuller, who administers the scheme, explained: 'We bring them in to the Centre in groups of four to prepare them for their first taste of work experience. The idea is that each will get to know at least three others quite well. After an introductory talk and a video, comes a tour of the Centre to see the particular area they will be working in.

'When they join the scheme in September, groups are brought in for three days' preparation, which starts with a formal interview with the personnel manager and respective department heads. On the second day they play business games — including Shell's own Enterprise Game with the aim of getting them to think and work together as a group.

'Next comes a tour of local Shell locations to remind them that we are an oil company. Armed with a questionnaire, they are shown round a retail service station, the headquarters of Shell Lubricants and the premises of a major customer. The trainees are encouraged to find the answers to a host of questions, such as ways of marketing products, methods of encouraging motorists to patronise service stations, and identifying potential safety and security problems.

'The last day includes a closer look at specific jobs in four basic areas at the Centre — accounting, computing, telecommunications and engineering.

'A final session is devoted to a run-down on rules and regulations and a chat with their respective supervisors before the young recruits leave for home carrying a concertina file crammed with publications, a log book and a ring binder full of information.

It may be a lot for YTS trainees to take in over the first few days but John Fuller believes that, after five years' experience of running the scheme, they have got the programme just right. The answer probably lies in the fact that Wythenshawe achieves a 100 per cent success rate in placing the young people in jobs outside the company.

With staff based at a diversity of locations in the UK, performing any one of a number of different jobs, methods of easing the settling-in process are devised by Shell to suit local needs and operating conditions.

Don Sutherland of Esso Petroleum plc, has been awarded the Gold Quill Award from the International Association of Business Communicators (IABC) for the Tiger Talk series of audio tapes for Esso's truck operators.

Carless, Capel & Leonard has announced the appointment of **Brian Neale** as Finance Director of the Company. Its subsidiary Carless Exploration Ltd, has named **Peter Clark** as Managing Director.

Stephen D Griffith has been named Manager, International Analytical Services of Katalistiks International Inc, a wholly owned subsidiary of the Union Carbide Corporation.

Gary Kibblewhite, Managing Director, Special Business Group, Lex Electronics, has been elected Chairman of the Association of Franchised Distributors of Electronic Components (AFDEC).

Qubit, manufacturers of integrated navigation/survey systems has announced the appointment of **John Hammer,** at its recently opened North American office in Maryland.

Motoren-Werke Mannheim AG has appointed **Dr Gerhart Peleschka** as a member of the Board. The Company also elected **Dr Karl-Josef Neukirchen** as a member of its Supervisory Board.

Llewellyn 'Lew' Bailey has been appointed Project Group Manager of King Wilkinson Ltd, Engineering and Project Management Consultants.

As part of an ongoing growth and expansion programme for the 1992 European export market, Wade Couplings Limited has appointed **Martin Collinge** as Export Sales Manager.

George Wimpey PLC has announced the appointment of **RJ Hedges** as Business Development Manager for Wimpey Engineering, the Group's onshore process and energy engineering and contracting company.

Three managers with the oil field chemical's group of Petrolite Corporation have been assigned to new areas of responsibility within the Group's operations: **Sam Toscano** has been appointed General Manager of Petrolite's Ecuador subsidiary, Ecuatoriana de Petroquimicos; **Tom Lannen** will be taking over Toscano's job as Product Manager, oil field chemical's group's oil paraffin product lines; Lannen's present responsibilities for Petrolite Canada Inc will now be assumed by **Bob Beals.**

Foster Wheeler Ltd has bought a 10 per cent stake in the Project Management Group, one of Ireland's major engineering consultants. The above picture shows (from the left), Brian Kearney, Managing Director, Project Management, Tim Evans, Deputy Chairman, Foster Wheeler (seated), Jim Walsh, Managing Director, Project Management's Overseas Operations, Ray Bignell Diversification and Acquisition Manager, Foster Wheeler Ltd.

Pierre Desprairies, Honorary Chairman of the Board of Administration of the Institut Francais du Petrole, has become the first Frenchman to be awarded the annual prize of the International Association of Energy Economics (IAEE), which rewards an exemplary contribution to energy economics and to studies in this field.

Tudor Williams has been named as an Associate Director of CWA Consultants.

The Secretary of State for Energy has appointed **James Capel and Company** as advisory brokers to the privatisation of the electricity industry in England and Wales.

Ronald E Cannon, Executive Director for the Gas Processors Association, Tulsa, Oklahoma, has been named as the recipient of the ASTM's Award of Merit, for his contributions as Secretary of Subcommittee D02.HO on Liquified Petroleum Gas. He was also cited for his contributions as working conveyor of ISO/TC28/SC4, Working Group 8 on the Classification and Specification of Liquified Petroleum gases.

Britoil announced recently that **Alan G Ace** (above, left) and **Mark Woolveridge** (above, right) have been appointed Executive Directors of the company, following the retirements of Malcolm Ford and Bob Spiers.

Carless Refining & Marketing has recently acquired Pentagon Chemicals. Pentagon will retain independent status, and **Dr Peter Inglis,** Pentagon's Managing Director, has joined the Board of Carless.

Tony Lodge has been appointed Managing Director of ABB Industry Ltd, a company in the Asea Brown Boveri Group.

Tony Mazengarb has been appointed Site Manager for Metal and Pipeline Endurance Ltd (MAPEL) at its British Nuclear Fuels Sellafield site.

Lewis E Akin has been elected to the Board of Directors of CBI Industries Inc.

Englehard's UK Petroleum Catalyst Department has announced the appointment of **Paul A Minton,** as Senior Technical Service Engineer (FCC).

Stephen Huddle has been appointed Corporate Affairs Director of Elf UK PLC, and Company Secretary of Elf Aquitaine UK (Holdings) Plc, British subsidiaries of the Elf Aquitaine Group. He has replaced **Keith Jameson,** who has joined Elf Malaysia as managing Director.

Dunlop Armaline Ltd, part of Dunlop Offshore, has appointed **Philip Cocks** as Director and General Manager.

The Coastal Corporation recently announced the appointment of **Joseph P Kearney** as Chairman and Chief Executive Officer of Coastal Power Production Company.

Tony Ryde has been appointed Manager of BP Oil's Retail Division with responsibility for the company's network of 2000 service stations. He succeeds **John Perry** who has moved to BP International.

Robert E Howson has been elected Chairman of the Board and Chief Executive Officer of McDermott International Inc.

Dr Philip Morgan, recently Head of Warburg Securities Research, will join SBCI Savory Milln, effective September 12.

Texas Eastern announced recently that **J B Hipple**, Vice President and Controller, has been named Vice President and Chief Financial Officer.

The Northern Associated Gas System operated by Shell/Esso

by Mr DI Prior, Head of Technical Services, Fife NGL Plant, Shell UK Exploration and Production

As an introduction, **Figure 1** is a diagram of the North Sea which shows principal fields and pipelines. The paper is primarily concerned with the central and Northern North Sea, thus the relevant gas lines are Fulmar coming from the central area; and the Flags line coming from Brent area. The other gas line is the Frigg line. All these lines land at St Fergus. The oil lines shown are the Forties line to Cruden Bay and the Ninian and Brent lines going to Sullom Voe.

The history of the Northern Associated gas system operated by Shell Expro on behalf of Shell, Esso and other Companies **Figure 2** starts in July 1971, when the Brent oilfield was discovered, and eventually declared commercial in August 1972. The high gas to oil ratio, and in line with the government desire to prevent flaring off gas, led to the start in December 1973 of the design basis for a gas plant at St Fergus and an NGL plant at Peterhead. An agreement with British Gas was reached in 1975, and RM Parsons were awarded the managing contract for the two plants in 1976.

It was now becoming apparent that the North Sea weather could only be calmed in Peterhead Harbour at enormous expense to allow a high utilisation for LPG ship handling. A search was initiated for another suitable protected deep water harbour. After scouring the East Coast of Scotland for a suitable site, Braefoot Bay in the Firth of Forth was identified. Braefoot Bay has natural deep water, is sufficiently far up the Firth of Forth to be largely unaffected by the North Sea, and furthermore is protected by Inchcolm Island. Additionally, the Mossmorran site (7 km inland) was zoned for industrial development. Approval for the development was given in August, 1979 after a Public Enquiry.

In the meantime construction at St Fergus was proceeding, and first gas came ashore in April, 1982. As facilities at Mossmorran and Braefoot Bay were not complete, the NGLs were broadly split in a new column to supply gaseous LPG to Boddam Power Station and a gasoline stream into the Forties Crude Line at Cruden Bay.

The first gas for purging arrived through the NGL line at Mossmorran in May 1984, followed by NGL, and the first shipment of LPG left Braefoot Bay in September, 1984.

The Fife Ethylene Plant operated by Exxon Chemicals Olefins Inc was started about a year later and consequently delivered its first shipment of ethylene in November, 1985.

It is only reasonable at this stage to give you an indication of the money involved in the project. These costs only relate to the Flags line, and the onshore facilities and do not include costs of offshore compression. In 1987 terms the Flags project cost £1,443 million plus over £400 million for the Fife Ethylene Plant **Figure 3**.

Figure 4 shows the original design basis with only Brent and the onshore facilities. The current situation is shown in **Figure 5**, which includes all the additional platforms which have been incorporated into the system, with scope for additional connections.

It is important to realise that none of this was arranged quickly or easily. There are 56 interlocking agreements involving

Figure 1

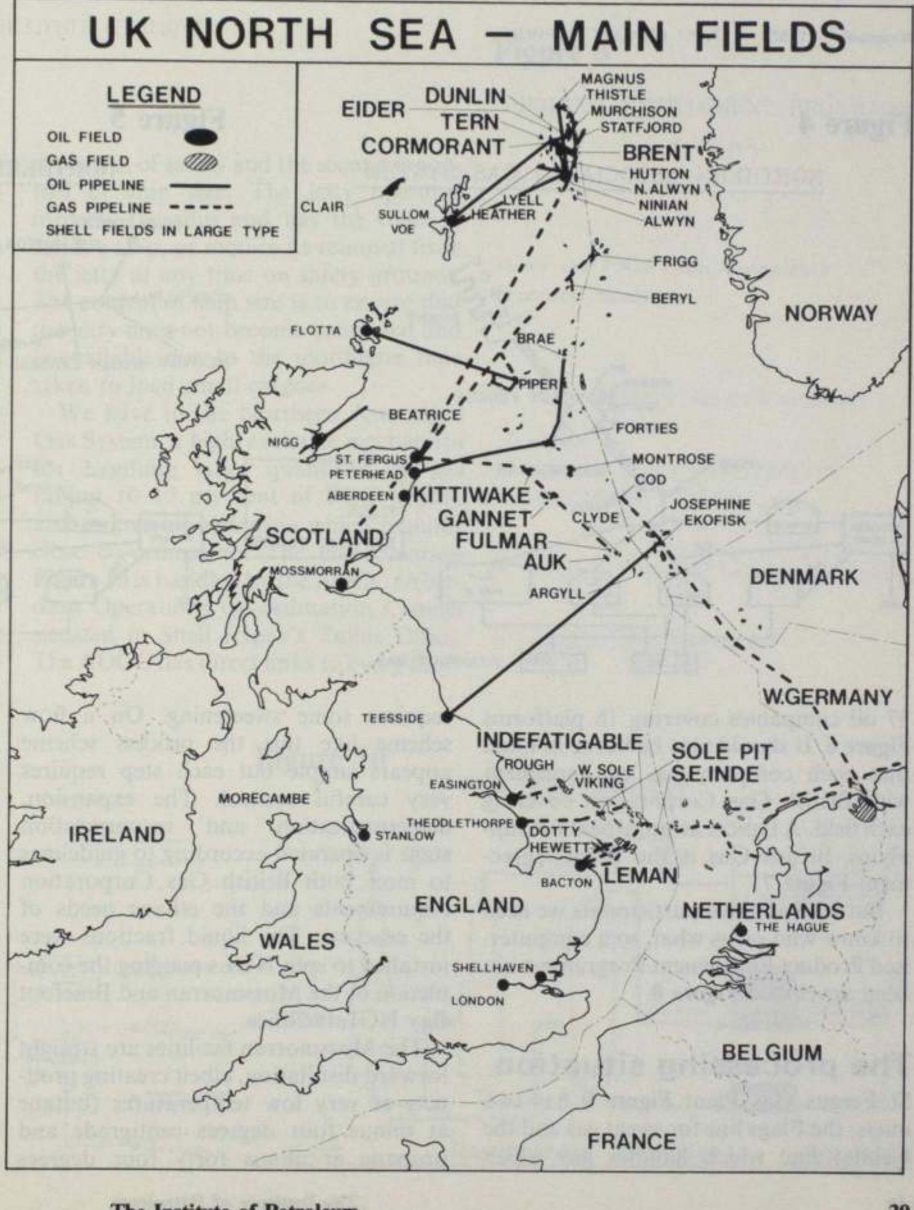


Figure 2

NORTHERN ASSOCIATED GAS SYSTEM

July	1971	BRENT DISCOVERED
August	1972	BRENT DECLARED COMMERCIAL
December	1973	DESIGN BASIS STARTED – ST FERGUS GAS PLANT – PETERHEAD NGL PLANT
June	1975	SALES AGREEMENT WITH BRITISH GAS
August	1976	R.M.PARSONS AWARDED CONTRACT
November	1976	NGL PLANT RELOCATED TO FIFE
July	1977	CIVIL WORK STARTED AT ST FERGUS PUBLIC ENQUIRY ON FIFE PLANT
August	1979	SECRETARY OF STATE GIVES CONSENT FO FIFE PLANT CIVIL WORK STARTS IN FIFE
April	1982	FIRST GAS AT ST FERGUS
May	1984	FIRST GAS AT MOSSMORRAN
September	1984	FIRST LPG SHIP FROM BRAEFOOT BAY
Novenber	1985	FIRST ETHYLENE SHIPMENT

Figure 3

COSTS

	£ MILLION
PIPELINE (BRENT TO ST FERGUS)	270
ST FERGUS	249
NGL PIPELINE (ST FERGUS TO MOSSMORRAN)	83
MOSSMORRAM & BRAEFOOT BAY	386
	988
1987 MONEY	1,443

(EXCLUDES ETHYLENE CRACKER COST OF OVER £400 MILLION)

Figure 4

NORTHERN ASSOCIATED GAS SYSTEM

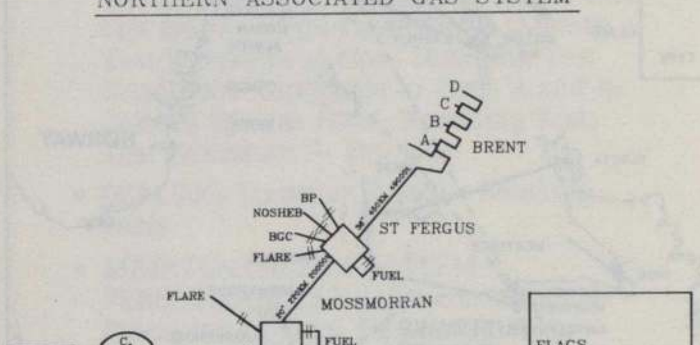
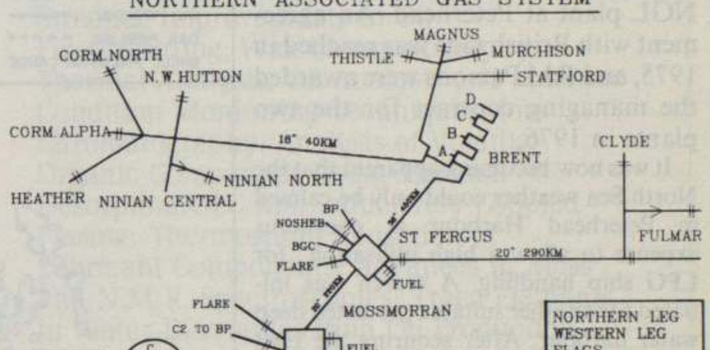


Figure 5

NORTHERN ASSOCIATED GAS SYSTEM



37 oil companies covering 16 platforms **Figure 6**. It should also be borne in mind that each company has an agreement with British Gas Corporation covering each field. A typical arrangement for supplying British Gas is the Brent Agreement **Figure 7**.

But with all these participants we need to know who owns what, so a computerised Product Entitlement Programme has been developed **Figure 8**.

The processing situation

St Fergus Gas Plant **Figure 9** has two inlets; the Flags line for sweet gas and the Fulmar line which handles gas which requires some sweetening. On a flow scheme like this the process scheme appears simple but each step requires very careful control. The expansion, demethanisation and recompression stage is operated according to guidelines to meet both British Gas Corporation requirements and the ethane needs of the crackers. The liquid fractions were installed to split NGLs pending the completion of the Mossmorran and Braefoot Bay NGL facilities.

The Mossmorran facilities are straight forward distillation, albeit creating products at very low temperatures (butane at minus four degrees centigrade and propane at minus forty four degrees centigrade), but the cryogenic storage facilities are amongst the most sophisticated in the world. The transfer lines carrying cryogenic material to Braefoot Bay are the longest underground lines carrying fully refrigerated product **Figure 10**. The lines are kept cold by continuous circulation at all times. No flaring is permitted at Braefoot Bay, and in terms of loss control we cannot afford to lose any of the gas evolved during the ship loading operation. Vapour lines carry the gas displaced during loading back to the refrigeration systems at Mossmorran **Figure 11**. Unacceptable vapours containing contaminants are diverted to the Mossmorran flares.

Figure 6

Northern Associated Gas System Partners & Participants

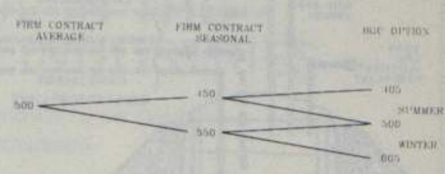
	Western LEG			Northern LEG					Fulmar LEG	
	?? ??	S/E (N & S Corn)	N W Hutton (Amoco)	Chevron (Ninian)	BP (Magnus)	Britoil (Thistle)	Conoco (Murchison)	Conoco (Stafford)	Fulmar	Clyde
Shell UK Ltd	×	×							×	×
Esso Pet. Co. Ltd	×	×							×	×
Conoco UK Ltd			×			×	×	×		
Golf Oil Corp.			×			×	×	×		
Santa Fe Minerals						×				
Dewnex OG						×				
Tricentrol						×				
Fina Pet. Dev.						×				
Premier Oil						×				
Fina Hydrocarbon						×				
Ultramar						×				
Britoil			×	×		×	×	×	×	×
Mobil North Sea			×						×	
Statoil							×			
Conoco Norway							×			
Norse Shell							×			
Saga Petroleum							×			
Amerada Norway							×			
Amoco Norway							×			
Texas (Norway)							×			
Amoco UK Expro			×						×	
Enterprise Oil			×						×	
Amerada			×						×	
Texas Eastern			×				×		×	
Mobil Norway							×			
BP Pet. Dev. Ltd				×	×					
Ranger Oil UK Ltd				×						
Lasmo North Sea Ltd				×						
ICI Petroleum Ltd				×						
Murphy Petroleum Ltd				×						
Ocean Exploration Co. Ltd				×						
Chevron Petroleum UK Ltd				×						

58 Product Accounts required to cover every ×
November 1986.

Figure 7

BRITISH GAS CORPORATION CONTRACT

BGC NOMINATION MILLION CUBIC FEET DAY



OTHER VARIATIONS AT DIFFERENT VALUES

VARIABLE CONTRACT QUANTITY SELLER NOMINATES 1 MONTH AHEAD

OPTION GAS SELLER OFFERS 15 HOURS AHEAD

EXCESS GAS BUYER REQUESTS AT 24 HOURS NOTICE

Figure 8

PRODUCT ENTITLEMENT PROGRAMME

(P.E.P.)

There are FOUR main statements produced monthly :-

A DAILY PRODUCT BALANCE SUMMARY

B MONTHLY PARTICIPANT PRODUCT ENTITLEMENT BY FIELD

C MONTHLY PRODUCT BALANCE BY FIELD

D TANKER LIFTING SUMMARY

Control of shipping is an important part of the arrangements for ensuring safety of the operation.

The first aspect to note (**Figure 12**) is that Inchcolm Island is used as a roundabout to create a one way traffic situation. Shipping therefore approaches the jetty from the west and departs to the east.

In addition, **Figure 13**, there are a number of traffic rules specifically for LPG ships. These basically require tugs for all movements and a sterile zone of 1 mile around each ship whilst it is moving.

Naturally, we have to control the ships when they are alongside the jetty, and a set of jetty regulations **Figure 14** are sent to every ship. The principle points are aimed at two aspects, the paramount one is control of safety and the second is control of ship size. The jetty operator inspects the ship and has the right to reject a ship, or require its removal from the jetty at any time on safety grounds. The control of ship size is to ensure that the jetty does not become congested and unavailable due to the inordinate time taken to load small cargoes.

We have in the Northern Associated Gas System, a highly reliable mechanism for handling large quantities of gas (about 10–12 per cent of BGC needs), and an overall operation which requires close co-ordination. The co-ordination **Figure 15** is handled by the AOCC (Aberdeen Operations Co-ordination Centre) situated in Shell Expro's Tullos Office. The AOCC has direct links to every facil-

Figure 9

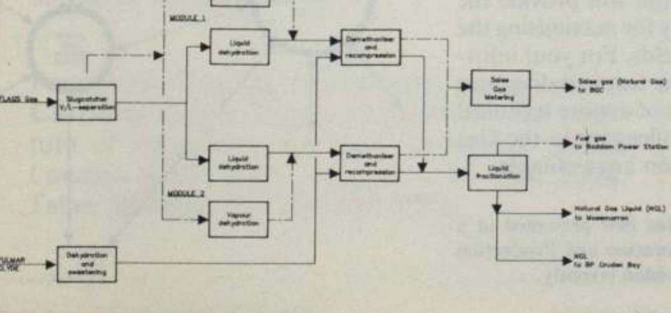


Figure 10

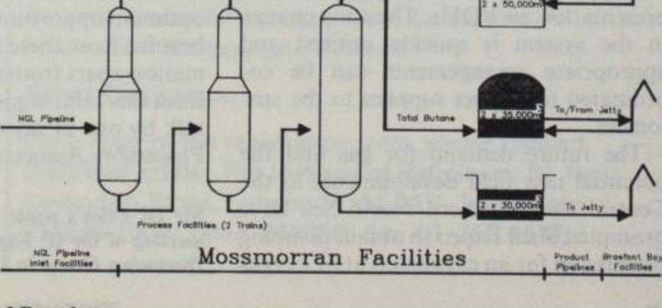


Figure 11

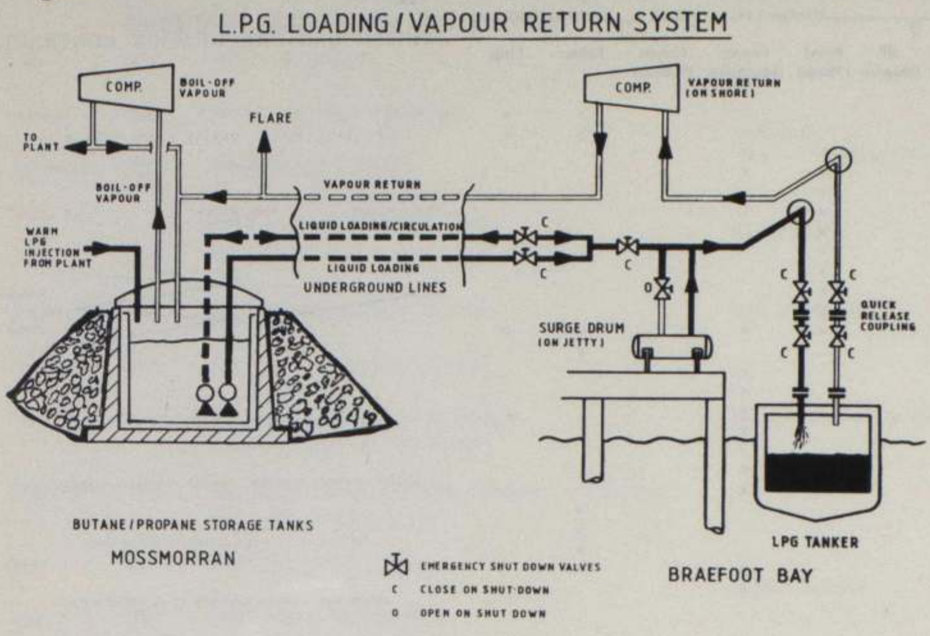


Figure 12

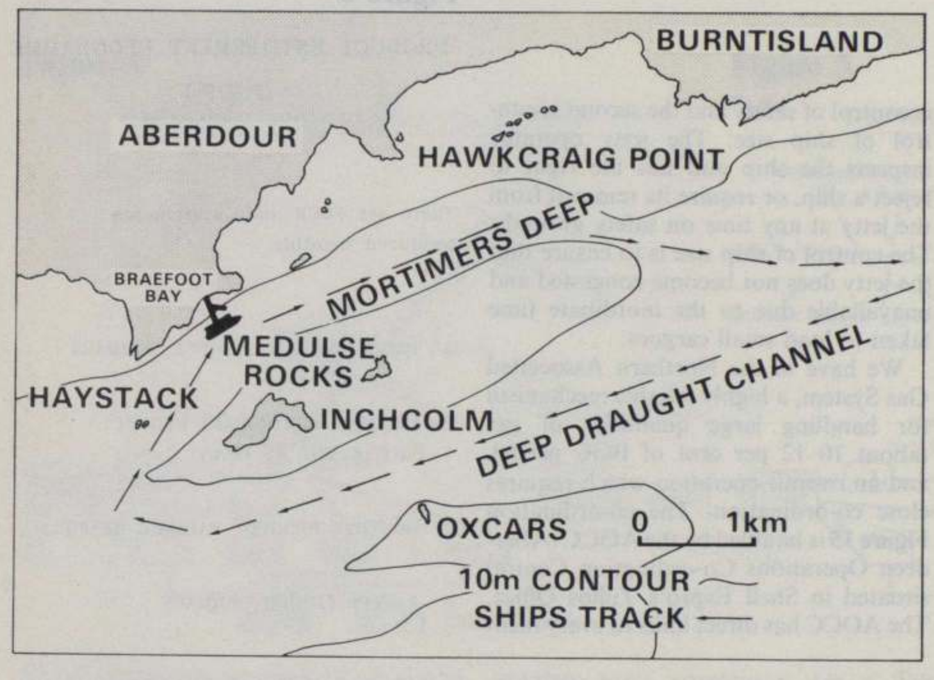


Figure 13

CONTROL OF LPG SHIPS

ADDITIONAL NAVIGATION RULES

TUGS FOR ALL MOVEMENTS

PILOTS FOR ALL SHIPS

NO SHIP WITHIN ONE MILE WHEN

- TURNING INTO MORTIMERS DEEP
- LEAVING MORTIMERS DEEP
- FULLY LADEN

Figure 14

MAIN JETTY REGULATIONS

IMO CERTIFICATION

INSPECTION BEFORE – BERTHING OR LOADING

REJECTION AT ANY TIME AT TERMINAL OPTION

- SAFETY INSPECTION
- CONDITION DETERIORATION
- POOR PERFORMANCE

TERMINAL STIPULATES

- AVERAGE LIFTING
- MINIMUM LIFTING

OPERATOR – NEGOTIATES CARGO AMALGAMTION

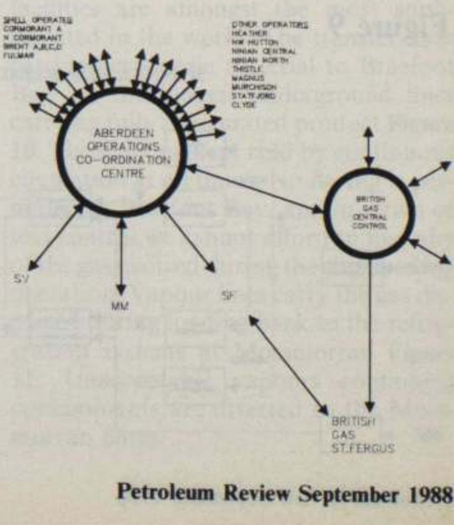
N.B. SYSTEM CAPABILITY – 3000M^3 /HOUR FOR EACH
(DUAL CARGO – 6000M^3 /HOUR)
DESIGN SHIP – 60,000M^3
MAX DRAFT AT BAR – 12M AT NEAP TIDE
– 13M AT SPRING TIDE

Figure 15

NORTHERN ASSOSIATED GAS SYSTEM

CO-ORDINATION

PLATFORM CONTROL ROOMS



ity in the North Sea which is connected to the Northern Associated Gas System, utilising telex, telephone, telemetry, computing systems and live data presentation on VDUs. Thus any change in the system is quickly noticed and appropriate arrangements can be co-ordinated to protect supplies to the customers.

The future demand for gas and the potential new field developments in the Central and Northern North Sea have prompted Shell Expro to obtain planning permission for an expansion at St Fergus and consider submitting an application for Mossmorran. The Infra structure to St Fergus with the NGL facilities down the line at Mossmorran will provide the optimum opportunity for maximising the benefits from these fields. For your information apart from the text and diagrams from this talk, copies of a more technical talk by one of my colleagues to the Gas Processors Association are available.

Mr DI Prior's paper was first presented at a meeting of the IP Exploration and Production Discussion Group in London recently.

Roger O'Neil (left), Chairman and Chief Executive of Mobil Oil Company Ltd, has been appointed to the Council of the Institute of Petroleum.

Peter Proctor (right) has been re-appointed to the Institute of Petroleum Council, on which he served from 1985–1988. He is former Chairman of the IP Membership Committee.

John Livermore (left) receiving an Institute of Petroleum Student Prize from Peter Johnson, Chairman of the Institute's Aberdeen Branch, at a recent meeting of the Branch. John was the student with the best overall performance on the MSc (CNAA) course in Offshore Engineering at Robert Gordon's Institute of Technology, Aberdeen in the 1987—88 academic year.

Correction

In our August issue, we reported that Mike O'Sullivan, Manager, Dorset Development, BP Petroleum Development Ltd., had received an MBE in the Queen's Birthday Honours List. He is a Fellow of the Institute and not a Member.

Around the Branches

Aberdeen

Secretary: David Corkhill, Total Oil Marine plc, Crawpeel Road, Altens Estate, Aberdeen AB9 280. Tel: 0224 858000.

Unless otherwise stated, meetings will be held at Treetops Hotel, 161 Springfield Road, Aberdeen, at 1830 hours.

1988

11 Oct: 'Handling H2s Offshore', by Bill Cochrane, Chevron Petroleum (UK) Ltd.

3 Nov: Annual Dinner. Guest speakers: Sir Archibald Forster, The Hon Peter Morrison and Jan Whgeerlings, Netherlands Ministry of Economic Affairs.

13 Dec: 'Brae Bravo Project', by Bill McCaskin, Marathon Oil UK.

1989

10 Jan: 'Eurotunnel' (to be confirmed).

14 Feb: AGM. Venue: National Hyperbaric Centre.

14 Mar: 'Pumps and Pipeline Technology', by a speaker from Weir Pumps.

17 Mar: Dinner Dance. Venue: Skean Dhu Hotel, Dyce.

11 Apr: '1992', by a speaker from the European Commission.

9 May: 'The Heidrun Project — A Concrete TLP', by Willie Downie, Conoco Norway.

Edinburgh and South-east Scotland

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

Meetings this session will be held in the Royal Scot Hotel, Glasgow Road, Edinburgh at 1930 hours, unless otherwise stated. Cash bar facilities will be available before and after the meeting.

1988

3 Oct: 'Downhole Analysis', (speaker to be confirmed). Joint meeting as guests of the Institute of Measurement and Control. Venue: Forth Bridge Motel at 1930 hours.

3 Nov: 'Peat and Lignite as Power Station Fuels', by a speaker from BP Coal.

22 Nov: IP/Phillips Student Lecture: 'Elevating Six Platforms 6.5 metres — only an Intermezzo in the 70–80 Year Lifespan of Ekofisk', by R Wiborg, Engineering Manager, Phillips Petroleum Co, Norway. Venue: Heriot-Watt University, Riccarton at 1630 hours.

6 Dec: 'Re-instatement', by B Smith of the Engineering Research Station, British Gas. (Joint meeting as guests of the Pipeline Industries Guild). Venue: Harp Hotel at 1830 hours.

1989

26 Jan: 'Current Developments in Wind Energy', by A Brown of Howden Scirocco, followed by AGM.

16 Feb: Joint meeting as guests of the Institution of Chemical Engineers. Topic, speaker and venue to be confirmed.

16 Mar: Spouses Evening: 'Scottish Silver', by M Clayton, Director of Christies, Scotland.

Essex

Secretary: Alan Davison, Mobil Company Ltd, Research and Technical Service Laboratory, Major Way, Coryton, Stanford-le-Hope, Essex. Tel: 0375 646224.

All meetings will be held in the Pegasus Club, Herd Lane, Corringham, at 1730 hours unless otherwise stated. Tea will be available at 1715 hours. Cheese and wine at close.

1988

12 Oct: 'Petrol Retailing — A Forward View', by a speaker from Kuwait Petroleum (GB) Ltd.

9 Nov: Ladies Evening: 'Changing Fashions in Wallpaper', by Mrs L Brown, Interior Designer, Shell Chemicals UK Ltd, at 1930 hours.

1989

11 Jan: 'Terminal Automation — A Review', by C Johnson, Esso Petroleum Co Ltd.

8 Feb: AGM, followed by 'External Affairs — All Things to All People', by KB Parfitt, Petrofina (UK) Ltd.

8 Mar: 'UK Multi-Product Pipeline Operations', speaker from the British Pipeline Agency.

17 Mar: Annual Dinner Dance, De Havilland Suite, Airport Moat House, Southend-on-Sea.

Humber

Secretary: BE Soulsby, Webb Bros (General Contracting & Marine Engineers) Ltd, Armstrong Street, West Marsh Trading Estate, Grimsby, South Humberside DN31 1XD. Tel: 0472 53103.

All meetings will be held at the Humber Royal Hotel, Grimsby, unless otherwise stated, and will begin at 1930 hours.

1988

6 Oct: 'Wind Power', by Dr David Lindley, General Manager, Wind Energy Group, Taylor Woodrow/British Aerospace/GEC.

28 Oct: Annual Dinner Dance. Venue: Beachcomer, Humberston.

24 Nov: 'Refinery Construction and Maintenance', by a speaker to be announced.

1989

19 Jan: Lecture to be given by the Deputy Director, Naval Operation and Trade.

9 Feb: AGM

3 Mar: Annual Dinner. Venue: Beachcomer, Humberston.

30 Mar: 'Cavern Storage', by Alan Green, Principle Process Engineer, Conoco, Humber Refinery; Tim Brant, Jetty Controller (General), Associated Petroleum Terminal.

13 Apr: Ladies night. Venue: Beachcomer, Humberston.

17 May: 'The Roll of the Specialist in the Engineering Industry', by a speaker to be announced. Joint meeting with the Grimsby Institution of Engineers and Shipbuilders. Venue: Wintergarden, Cleethorpes.

Irish

Secretary (Acting): HMS Miller, Total Marine Ireland, Lower Hatch Street, Dublin 1. Tel: (0001) 615855.

1988

19 Sep: Annual Golf Outing, Woodbrook Golf Course. Includes Dinner. First tee off 1100 hours.

Oct (date to be confirmed): 'Review of the Irish Offshore Exploration Basins in Comparison with Exploration Basins Worldwide', by Dr Pat Shannon and Dr Dave Naylor.

17 Nov: Annual Dinner Dance. Main speaker Ray Burke, TD, Minister for Energy. Venue: Burlington Hotel, Dublin.

1989

Mar (date to be confirmed): Seminar on 'The Use of Unleaded Petrol', in conjunction with the Society of Irish Motor Industry.

London

Secretary: Mrs Edith 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.

1988

21 Sep: 'Do You Have An Attitude Problem?', 'How Service Makes All The Difference', by J Smythe, The Wolff Olins Business.

19 Oct: 'MTBE in Refinery Operations', by C Neilson, Petrofina.

23 Nov: 'Novel Use of a Sub-sea Completion Assists Appraisal of the Strathspey Field', by CT Hooper and NJ Browne, Texaco.

14 Dec: 'European Autocatalysts — Market and Technology', RA Searles, Catalytic Systems Division, Johnson Matthey.

1989

18 Jan: 'Dangerous Maintenance', by GH Davies, Chemical National Interest Group, Health and Safety Executive.

14 Feb: 'Is Corporate or Individual Performance the Key to Reward and Recognition in the Oil Industry?', by MJE Taylor, Shell Oil UK.

15 Mar: 'The Oil Industry Looks Forward', by Sir Archibald Forster, (President IP), Esso UK plc. This will be preceded by the AGM.

7 Apr: Annual Dinner Dance. Venue: Elizabeth Suite, Barrington House, Gresham Street, London EC2.

19 Apr: 'Multi-Product, Company, Offtake Pipelines', by MR Davis, British Pipeline Agency.

24 May: 'Oil Supply — A Ship Owners View', by K Borch, AP Moller, Copenhagen.

Midlands

Secretary: DJ Margaroni, Joseph Batson and Company Limited, Dudley Road, Tipton, West Midlands DY4 8EH. Tel: 021 557 2284.

All meetings will be held at the University of Birmingham's Department of Chemical Engineering at 1800 hours, unless otherwise stated. Light refreshments will be available.

1988

19 Oct: 'Biodegradation of Oil', by Dr G Morton, Lancashire Polytechnic.

16 Nov: 'Total Quality Management', by PD Claxton, BP.

14 Dec: Social Evening. 'Gentleman's Smoking Evening', by T Bethell, President, Ledbury Rugby Club. Venue: Aston Villa FC.

1989

18 Jan: 'Ocean Terminals', C Arthey, Esso Petroleum.

20 Jan: IP/BLF (British Lubricants Federation) Dinner Dance. Venue: Parkhall Hotel, Wolverhampton.

15 Feb: AGM and Film Night.

8 Mar: 'Synthetic Lubricants', by A Robertson, ICI.

16 Jun: Summer Outing to the Black Country Museum, Dudley.

Northern

Secretary: Dr P Miles, c/o Ciba-Geigy Industrial Chemicals, Tenax Road, Trafford Park, Manchester M17 1WT. Tel: 061 872 2323.

All meetings will take place at the Belfry Hotel, Handforth at 1830 hours, unless otherwise stated.

1988

29 Sep: Ladies' Evening, Antique Road Show. Time: 1930 hours.

18 Oct: 'Onshore Exploration', by P Clark, Carless Explorations.

15 Nov: Energy & Nuclear Power', by a speaker from British Nuclear Fuels.

25 Nov: Annual Dinner Dance.

1989

17 Jan: 'Compressor Oils', by DA Cassidy, Ciba-Geigy Industrial Chemicals.

14 Feb: AGM, followed by 'Corrosion in the Oil Industry', by W Harding, EMS TOGO Ltd.

14 Mar: 'Major Hazards' Assessment', by Dr R Pate, HSE, Joint meeting with Stanlow Branch. Venue: Lord Daresbury, Chester Road, Daresbury, Nr Warrington.

10 Apr: Annual Hot-Pot Supper. Venue to be announced.

Shetland

Secretary: PN Guy, BP Petroleum Development, Sullom Voe Terminal, Mossbank, Shetland ZE2 9TJ. Tel: 0806 243570.

1988

13 Sep: Ladies Night, 'Marketing Oil to Olicks'. Venue: Maryfield Hotel, Bressay.

4 Nov: Annual Dinner. Venue: Lerwick Hotel.

22 Nov: 'Ten Years of Brent and Ninian Operations in Shetland'. Venue: Shetland Hotel.

1989

7 Feb: AGM, guest speaker to be arranged. Venue: Shetland Hotel, 1930 hours.

Southern

Secretary: J Wheadon, Esso Refinery Fawley, Southampton SO4 1TX. Tel: 0703 892511.

All meetings will be held in Room 20 at the ECL Training Centre unless otherwise stated.

1988

24 Sep: Treasure Hunt. Venue: The Heath Hotel, Dibden Purlieu at 0900 hours.

20 Oct: 'SASOL — The Unique Oil From Coal Process', by CD Jones, Esso Petroleum.

1 Nov: Address to Southern Branch by Sir Archibald Forster, President of the IP.

7 Dec: 'Coal or Nuclear, Which is Cleaner?', by T Langford, CEGB.

1989

17 Jan: AGM, followed by 'A Week in the Life of a Factory Inspector', by JA Holland, Principle Inspector of Factories.

19 Feb: Inter-Institute Skittles Match. Venue: Bold Forester, Marchwood.

30 Mar: Visit to Southampton Oil Spill Response Base.

7 May: Visit to Meon Valley Vineyard.

1 Jun: Visit to Wytch Farm.

South Wales

Secretary: IJ Thomas, BP Oil Llandarcy Refinery Ltd, Neath, West Glamorgan SA10 6HJ. Tel: Skewen 813232.

1988

22 Sep: 'Nuclear Energy — The Facts', by Colin Howells, SWEB. Venue: Texaco Refinery, Milford.

14–16 Oct: Visit to Channel Tunnel Project.

10 Nov: Seminar 'Computers and Safety in Process Industries'. Joint HSE, Wintech, IMechE, IEE, IP seminar. Venue: Holiday Inn, Cardiff.

24 Nov: 'The Cyclar Process for Production of Aromatics from LPG', by Tony Hall, BP Research Centre, Sunbury. BP Oil Llandarcy Refinery.

1989

19 Jan: 'Quality Retailing', by N Lambert, Manager, Retail Sales, Texaco Ltd. Venue: Amoco Refinery Pembroke.

23 Feb: AGM, followed by 'Exotic Fruits and Vegetables', by Elizabeth Perman Venue: Ivy Bush Royal Hotel, Carmarthen.

23 Mar: 'Carbon Heart Valves — Engineering and Biological Problems', by Dr Gwyn Jenkins, Materials Engineering Dept, Swansea University.

20 Apr: 'Emergency Planning in West Wales', by SR Hill, Chief Civil Protection Officer, Dyfed County Council. Venue: Gulf Refinery Milford.

Stanlow

Secretary: Mrs H Fitzgerald, Penymynydd, Tremeirchion, St Asaph, Clwyd LL17 OUS. Tel: 0352 720774.

1988

22 Sep: Ladies evening: 'Perfumery', by J Johnson, Kendal Mills.

Venue: Mollington Banastre, Chester.
27 Oct: 'Money and the Oil Industry', by J Walker, Royal Bank. Venue: Shell Stanlow at 1730 hours.
25 Nov: Dinner Dance.
14 Dec: 'Biodegredation of Oil', by G Morton, Lancashire Polytechnic. Venue: Shell Thornton at 1730 hours.

1989
19 Jan: AGM. Guest speaker, M Woodcock, MP. Venue: Shell Thornton at 1630 hours.
15 Feb: Joint Meeting with Institute of Energy. Details to be confirmed.
14 Mar: 'The work of the Major Hazards Assessment Unit', by Dr Pape. Venue: Lord Daresbury, Warrington.
19 Apr: 'Environmental Planning and the Oil Industry', by W Cairns. Joint Meeting with SCI. 1730 hours at a venue to be arranged.

West of Scotland
Secretary: J Hallet, Britoil plc, 301 St Vincent Street, Glasgow G2 5DD. Tel: 041 225 4951.
All meetings will take place at the Hospitality Inn, 36 Cambridge Street, unless otherwise stated.

1988
8 Sep: Branch Golf Tournament. Venue: Williamwood Golf Club.
9 Oct: Celebrity Lecture; 'Energy for Scotland', by Basil Butler, Managing Director, BP.
17 Nov: Dinner and Lecture; 'A Gas Strategy for the UK', by James Allcock, British Gas plc. Venue: Strathclyde University.
8 Dec: Technical Visit to Hunterston Nuclear Power Station.

1989
9 Feb: AGM, followed by 'Safety — Self Regulations or Statute', by Jim Petrie, Dept of Energy.
9 Mar: Petroleum Dinner.

Yorkshire
Secretary: PD Osler, Osler Fuels Ltd, Battye Street, Bradford BD4 8AG. Tel: 0274 763521.
All meetings will be held at the Mansion Hotel, Roundhay, Leeds, at 1930 hours unless otherwise stated.

1988
13 Sep: Ladies Night, visit to Crakehall Watermill, Bedale.
11 Oct: 'Laboratory Engine Testing', by John Maycock, Manager, Mechanical Testing Lab, Lubrizol Int.
8 Nov: 'Oil Distribution Safety Legislation — Today and the Future', by RJ Dingham, Shell Oil UK Ltd.
13 Dec: Trip to the Tribology Dept, Leeds University.

1989
10 Jan: 'Lead in petrol', by Ted Williams, Director General, IP.
14 Feb: AGM, followed by Hot Pot Supper with guest speaker.
14 Mar: Joint meeting with the Institute of Energy.
17 Mar: Annual Dinner Dance.
14 Jun: Golf Match.

Royal Society of Chemistry

The Royal Society of Chemistry invites nominations for its 1988 Interdisciplinary Awards, involving chemistry and one or more other sciences. Further details are available from Dr J F Gibson, Royal Society of Chemistry, Burlington House, London, W1V 0BM.

New Collective Member

Kuwait Petroleum (GB) Limited was formed in 1987 to manage the combined operations of the Pace, Sadler, Roberts, Ultramar and Nafta companies. Its activities include marketing of fuels and lubricants through retail service stations, distributors and direct to commercial customers throughout the UK. The company also operates Ross Storage Company in Scotland and Sadler Transport Company, based in Middlesbrough. Kuwait Petroleum's retail service stations are being rebranded with the company's new logo and colours. An extensive range of lubricants for industry, commercial and private vehicles is marketed through its newly-created lubricants division. Kuwait Petroleum (GB) Limited is the latest company to be formed within the Kuwait Petroleum Group, which operates downstream refining and marketing throughout Europe.

New Members

Barkindo, Mohammad S, Nigerian National Petroleum Corporation, P.M.B. 12071, Rm 913, Falomo, Ikoyi, Lagos, Nigeria.
Chestnut, Alexander, 12 Denholm St, Greenock, Renfrewshire, Scotland PA16 8RJ.
Cowie, Simon P, Kuwait Petroleum International Ltd, 80 New Bond St, London W1Y 9DA.
Coyle, James E, 3 Forest Drive, Rickleton, Washington, Tyne & Wear.
Greenslade, Leonard S, Glade Engineering Services Ltd, 59 Oakleigh Park South, London N20 9JL.
Holkham, Frank V, 7 Wetherall Avenue, Layfield Farm, Yarm, Cleveland TS15 9TP.
Hunter, David R, Alders, 85 Wimpole St, London W1M 8AJ.
Kroon, Hendrik, H Kroon & Associates, Hilltop Hse, Gravel Path, Berkhamsted, Herts HP4 2PJ.
Lambert, Brian K, Petrolite Ltd, Kirkby Bank Rd, Knowsley Industrial Park (North), Liverpool L33 7SY.
Leyland, Andrew J, Chevron Petroleum (UK) Ltd, Ninian Hse, Crawpeel Road, Altens, Aberdeen AB1 4LG.
Lobb, Christopher, 18 Cairnston Rd, Nairsberry Park, Hartlepool, Cleveland TS26 0PB.
Lochhead, Alexander C, The Brown Hse, The Avenue, Ampthill, Bedford MK45 2NR.
McCulloch, Samuel H H, E W Saybolt & Co (UK) Ltd, Oliver Close, Riverside Estate, West Thurrock, Grays, Essex RM16 1ED.
Niven, David E, BP Oil Ltd, BP Hse, Victoria St, London SW1E 5NJ.
Perkin, Granville J, 16 Knighton Close, Broughton, Astley, Leicestershire LE9 6UG.
Phillips, Donald W, BP (New Zealand) Ltd, BP Hse, Customhouse Quay, Wellington, New Zealand.
Pond, Mark D, E W Saybolt & Co (S.A.), PO Box 46748, Fahaheel, 64018 Fahaheel, Kuwait.
Prior, Neville, The Haywain, Mill Lane, Dedman, Nr Colchester, Essex CO7 6DM.
Wilkinson, Mark D, 77 High St, Macclesfield, Cheshire SK11 7QQ.

Deliveries into Consumption

UK deliveries into inland consumption of major petroleum products — Tonnes

Products	*June 1987*	*June 1988**	*Jan–June 1987†*	*Jan–June 1988**	*% change*
Naphtha/LDF	187,410	306,670	1,550,440	1,647,520	+ 6.3
ATF—Kerosine	564,420	534,390	2,684,360	2,834,750	+ 5.6
Motor Spirit	1,906,340	1,978,720	10,685,440	11,311,300	+ 5.9
Burning Oil	108,170	101,970	1,062,610	996,670	− 6.2
Derv Fuel	725,030	803,300	4,113,190	4,577,410	+11.3
Gas/Diesel Oil	548,080	568,450	4,544,730	4,334,130	− 4.6
Fuel Oil	647,050	890,000	4,518,040	5,442,930	+20.5
Lubricating Oil	72,010	81,080	410,770	435,960	+ 6.1
Other Products	579,710	612,510	3,153,200	3,490,080	+10.7
Total above	5,338,220	5,877,090	32,722,780	35,070,750	+ 7.2
Refinery Consumption	401,560	450,000	2,557,150	2,721,620	+ 6.4
Total all products	5,739,780	6,327,090	35,279,930	37,792,370	+ 7.1

*Preliminary †Revised