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PETROLEUM REVIEW

Honorary Editor

PETER ELLIS JONES

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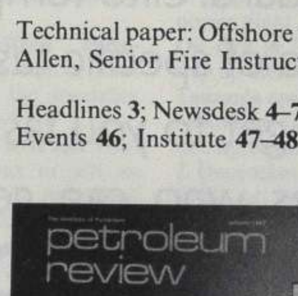
The Institute acquired its crest, designed by the College of Heralds, in 1949. Its motto, 'Conjunctione Potiores' (strength through unity), supports a shield portraying the Archaeopteryx, an avian fossil which was found in Jurassic strata similar in age to important oil-bearing formations in the North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



Cover: The petroleum geologists on the cover attended the 3rd Conference on Petroleum Geology of NW Europe in London recently. Centre front is Jim Brooks, Organising Committee Chairman. Also in the picture are: Siân Roblings (Geological Society), Nigel Rothwell (BP), Lynda Armstrong (Shell), Geoffrey McKinley (Britoil), Ken Glennie (Shell), Peter Dranfield (BP), Jennifer Brzozowska (Dept of Energy), Steve Begg (BP), Robert Smith (Britoil), Chris Wilson (Open University), Douglas Hobson (V.C. Illing & Partners), Robert Stoneley (Imperial College, London), Derek Blundell (New College London), Bernold Hanson (American Association of Petroleum Geologists), John Brooks (Dept of Energy), Martin Miller (Britoil), Jeremy Sargeant (Britoil), Sheila Jones (British Geological Survey), Richard Bateman (The Geological Society), Raymond Metter (Exxon), Lincoln Davis (Teredo), Lee Mills (Mills Oil & Gas), Kenneth Trott (Dept of Energy), Andrew Johnson (Total), Joseph Cartwright (Oxford University), Jeremy Hall (Glasgow University), Tadeusz Brzozowski (Phillips), John Wood (Marathon), Edward Purdy (Petroquest), Conrad Maher (Occidental). Photo by Jon Whitbourne.

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Headlines

17 November
Dome Petroleum's efforts to stave off bankruptcy were hit by an ultimatum from public creditors demanding repayment of their loans
The petrochemicals division of Elf Aquitaine — Atochem — has been given French Govt. approval to sell one of its units to a German plastics group
Libya warns several of its customers of likely delays in crude liftings
The Norwegian Govt plans to restrict shipping movements to South Africa
BP in South Africa calls for apartheid to be abolished and says it is prepared to put up money for projects to this end
According to Greenpeace Ciba-Geigy has been spilling weedkiller into the Rhine for more than a year

18 November
American scientists claim to have discovered a link between Aids and a very popular pesticide produced by Union Carbide and widely used in Great Britain
Union Carbide files a countersuit against the Indian Govt. and the state of Madhya Pradesh over the Bhopal disaster
Spain's Petroleos del Norte plans to have its shares publicly quoted next year
Sandoz says it will cut production of chemicals used to make insecticide by 60 per cent
Tricentrol announces the reorganisation of its American assets including a sale of assets which will raise £69.3m

19 November
British Coal is to seek planning consent for a £400m mine in the Midlands
Plans to establish a new Norwegian oil co for the operation of an oil field in Benin have been drawn up by Saga Petroleum and Norconsultant
A Statoil spokesman says Norway must build a new natural gas pipeline from the N Sea to W Europe regardless of France's decision to drop out of a buying consortium
Mobil Corp sells its 24 per cent interest in Western Platinum to Falconbridge of Canada for US $31.6m

20 November
Egypt is offering new oil production sharing arrangements to encourage exploration at a time of poor returns
Saudi Arabia cuts back Mitsubishi Corporation's requested exports for December by 25 per cent
A cloud of non-toxic gas sweeps over Basle after an accident at a Ciba-Geigy chemical plant

21 November
Two Japanese co's — Huanam Oil Development and Japex Nanhai — agree with China to conduct geophysical surveys in the South China Sea
The French Govt puts a temporary halt on all crude and refined products imports from the USSR in protest against France's increasing trade imbalance with Moscow
W Germany's largest fuel retailer — Aral — acquires the bulk of activities carried out by Propetrol — a fuel retailer in eastern France
Occidental merges its international and domestic petroleum operations into a single unit

24 November
BP Petroleum Development agrees in principle to buy the UK interests of Canada-based Sulpetro for around £17m
Mobil Oil Canada completes the acquisition of Canadian Superior Oil from Mobil Canada's American parent
Snamprogetti is to build a gas processing platform on a turnkey basis in India for $140m
Statoil makes two promising oil finds in the Haltenbanken region

25 November
ICI has decided to acquire the 38 per cent of Scottish Agricultural Industry it does not already own
According to a survey by Gaffney Cline and Associates up to 40 new UK offshore field developments could be needed between now and the end of the century to keep up with gas demands in Britain
Thailand plans to introduce petroleum law changes to induce oil co's to step up exploration
The US Dept. of the Interior has recommended allowing oil co's to explore for oil and gas in the Arctic National Wildlife Reserve

26 November
Enichem and Mitsui Petrochemical Industries sign a joint venture accord in the speciality chemicals area
Amoco Corp says it is not conducting negotiations to sell its one-third interest in Singapore Petroleum to Kuwait Petroleum
Atlantic Richfield's decision to sell $180m worth of oil and gas leases to the group's former chairman and Lonhro is being challenged in the American courts

27 November
London's loss-making freight futures market is to suspend trading in tanker futures
BP announces plans to get a listing for its shares in Tokyo
Three US oil co's — Amoco, Amerada Hess and Texas Eastern — are threatening legal action against Statoil because they are no longer making money out of gas sales from the Statfjord field
Statoil says agreement has been reached between the Troll group partners over a fallback plan for a field development if France decides not to buy supplies from Troll
UK Energy Secretary says Britain's power and fuel bills could be cut by £7bn as a result of EEC moves to improve energy efficiency

28 November
Lorry drivers will have to become knowledgeable about chemicals under new rules issued by the UK Govt to tighten control over dangerous goods carried by road
Brazil resumes a goods-for-oil barter trade with Nigeria which was suspended last year
A Lonhro spokesman says reports that the co was secretly negotiating with Libya to take over UK oil interests abandoned there were inaccurate and 'sensationalist'
A controversial search in Sweden for non-fossil natural gas has generated hopes that enough fuel will be found to supply most of the country's energy needs for decades

1 December
Occidental warns it might be forced to suspend sales of oil from its Flotta terminal after a leak in an undersea pipeline
The collapse of oil prices in '86 cut British industry's energy bills by about a quarter
Conoco is to disband a London-based exploration team but will try to avoid redundancies
Five people were killed and nine injured when an explosion ripped through an ICI chemical plant in Sydney
A French consortium led by CGEE Alsthom wins a FF3bn contract to supply a turnkey hydro-electric power plant in Kashmir
Oil co's in Nigeria are urged to step up their exploration activities
Tanzania opens up 3 new areas for oil and gas exploration after separate agreements with oil co's

2 December
BASF AG acquires the Zerex anti-freeze/coolant business of Du Pont's Conoco Inc
EEC Commission says it will help finance the $21m construction of 3 windmills in the UK, Denmark and Spain
Seven oil co's including Britoil and Shell lodge bids with the Indian Govt for contracts in its 3rd round of offshore tenders

3 December
Atlantic Petroleum buys Ultramar's lossmaking US marketing subsidiary — Ultramar Petroleum
France finally agrees to buy gas supplies from the Troll and Sleipner fields
A partnership led by T Boone Pickens is to make an unsolicited offer of $2bn for Diamond Shamrock Corp.
The Nordic countries reconsider plans for a natural gas network to link and extend the range of their gas pipelines

4 December
Coastal Corp's chmn says it might acquire Esso AG's Hamburg refinery
The West German Govt is to tighten laws covering the chemicals industry
New Zealand scientists claim to have found traces of oil below the sea floor in southern Antarctica

5 December
Switzerland's Sandoz is to cut the use of phosgene as part of new safety measures
Unilever, Oleofina Sa and Henkel KgaA are fined by the EC executive commission for exchanging details about sales

8 December
Amoco suspends oil exploration in Liberia
Conoco plans to shut down its 100m barrel oil field in Alaska

9 December
Australian oil co's predict that 10,000 jobs will be lost in the industry by the end of '86 owing to low oil prices
Cheap underground storage of electricity has been developed in Shell's Amsterdam laboratories
Petroperu will drill 2 oil wells in an Amazon jungle region
A long-delayed $462m plan to pipe gas to Malaysia's west coast and perhaps to Singapore is moving ahead

10 December
Texaco's Petronella field is inaugurated by the UK Energy Minister but it cannot come on stream until a pipeline is mended
Petro-Canada is expected to begin exploring for oil in W Ghana
Standard Oil forms a financial services subsidiary to handle its business affairs
Japanese oil co's and trading firms are now allowed to export oil products according to a Govt. official

11 December
The Norwegian Parliament is to effect changes in the country's oil tax regime which will result in a 25 per cent tax cut on future field development projects
Saudi Arabia has cut the tanker tonnage used to store crude by a quarter since Sheikh Yamani was dismissed
Diamond Shamrock Corp sells its South African subsidiary to Tiger Oats Ltd
Mitsubishi Petrochemical Co and Exxon Chemical are to set up a US joint venture to sell synthetic compound resin for use in the auto industry

The oil and motor industries in perspective

Dr Pierre Jungels, President of the Institute of Petroleum, contrasted recently the attitude towards the oil industry and the motor industry.

The motor industry does start out with some built in advantages, he told a conference on petroleum fuels organised by the Institution of Mechanical Engineers and his own Institution.

'Being both capital and labour intensive, the motor industry is seen by governments as an important creator of jobs,' he said, 'and a thriving motor industry is very much an industrial status symbol for a developed nation. As such it has a considerable fund of goodwill with political masters and the public.

Suspicion

The oil industry, however, is generally regarded at best with suspicion and often with hostility which manifests itself in abuse from the media every time the price of fuel is adjusted on the forecourts. Moreover, as an industry we have had to learn to be self-sufficient financially whether it be the massive investment required to recover crude from the North Sea or switch to low lead or unleaded motor spirit or finance the equally important R&D costs which we incur in testing the motor industry's engines and drive trains in our own research laboratories.

'Whereas the vehicle designer can at least start a new model with a blank drawing board, in our business, even if we are successful in finding an oil field, we have largely to accept the chemistry that nature provides and then develop the appropriate technology in order to tailor-make our products to the constantly changing requirements of our customers.

'Recent and anticipated changes in fuel quality both in motor gasoline and diesel fuel have been brought about both by the increasing concern about environment and the massive problems of adapting our refineries to cater for a product imbalance in consequence of increasing demand for transport fuels' and a dramatic decline in the black oil market.

Frankness

Whilst coping with the large plant investments needed to accommodate these changes, we have continued to co-operate closely with the motor industry and do not accept that we have collectively been anything other than frank with our motor industry colleagues in predicting the inevitable changes in fuel quality, imposed by the changing environment and by the optimisation of the refinery operations.

'We are totally confident that the fuels the oil industry supplies have continuously met the quality standards set by the normalising bodies in the different countries. There have, however, been recent cases where sensitive engines have been affected, apparently because of design or tuning parameters being set above specification or because the reference fuels were not representative of today's quality. In other words, some motor manufacturers designed for 'give-always' beyond accepted fuel standards.

'Being a cost conscious industry, we would not like to be tightened to too strict quality limits, because the cost of this would have to be passed on to the customer.

'As an industry we invest heavily in engine laboratories in order to study problem engines and we feel that in the past we have been called upon to overcome design or metallurgical problems which should have been solved at the pre-production stage.

Manipulation

'In the area of diesel fuel quality we are the victims of fiscal manipulation in some EEC countries which by using a disproportionately low tax on diesel fuel artificially and substantially increase the demand for diesel engines in passenger cars ignoring the fact that it is not feasible to greatly expand the volume without a decrease in quality or without a high rate of additives injection. It is a case of politically convenient fiscal measures which defy chemistry.

'Let us not overlook what has been achieved over the last 40 years. The fuel and lubricant quality has improved enormously permitting much higher compression ratios and improved engine efficiency combined with longer oil drain periods and better overall performance.

Instability

'But let us not forget the lessons of history which show how the impact of political instability reacts on the oil industry. This has led to the oil crises of 1973 and 1979. The underlying reasons of instability are still present and perhaps with a even worse risk of turmoil.

'The result of this is that the oil industry does not favour a strategy which defines too closely the limits wherein the specifications of the diesel gasoil and gasolines should be constrained. It is easier to redesign engines than to rewrite chemistry books.

'If the motor manufacturers have the perception that the quality of the transportation fuels have gone down, one should stress the point that the oil industry has at any time produced those fuels inside the limits of the national standard specifications, but has also, under pressure from the circumstances, come closer to those specified limits but without exceeding these.

Evolution

'There are a number of reasons for this evolution and it is not very relevant to state whether they are internal or external as they all are linked. The main issue is that to remain competitive the individual oil companies have optimised their operations, using existent or new equipment, expanding unit and tankage capacity, improving the blending, changing to better catalysts and injecting high performance additives to cover the qualitative and quantitive requirements of the market.

'This market has shown increased and in the case of diesel accelerated demand which the oil companies have tried, and we may say succeeded until today to match.

'There has been on top of this the intervention of the governing bodies which have aimed at satisfying the need of the public for a cleaner and healthier environment. The inevitable changes to achieve this have been brought to the knowledge of the oil industry as well as to the motor-manufacturers well in advance.

'I feel confident that the trust and cooperation which has enabled these achievements to be made will continue and the changes in fuel quality and the appropriate modifications to engine design referred to in this very valuable technical forum will be seen to have been fully anticipated. ●

Labour say: 'Help us with our oil plans'

The Labour party is anxious to obtain views from different sectors of the oil industry to help them formulate an oil policy, a matter to which they are now turning their attention.

This desire to consult was emphasised strongly by the Rt Hon Stanley Orme, MP, when he addressed a recent meeting of the Institute of Petroleum's Energy Economics Group.

Mr Orme is the shadow Cabinet's spokesman on energy, the Rt Hon Peter Walker's opposite number in the Opposition.

In the general outline which he gave, Mr Orme said that Labour's first priority, on election, would be to create jobs. Within that context the oil industry was seen as a contributor of wealth and an employer of skilled workers.

The offshore independents, indigenous high technology, and the oil refining industry were seen as being in particular need of support from the government.

The policy for oil, which would be part of an overall energy programme, would be expected to operate through a to-be-established British Enterprise Board. This would promote loans, for example, to develop marginal North Sea fields and the UK refining industry.

The North Sea revenues might well be placed in a separate account, instead of into the Treasury's 'big pot' so that these could be seen helping to spark the revival of Britain's 'devastated' manufacturing industry — via the BEB. Mr Orme sought to achieve this when the North Sea was in its early development in 1978, but was blocked by his own government's Treasury. He is still in favour of it.

Labour would not wish North Sea oil development to be left to market forces. But they would not be willing to do a deal with OPEC to determine prices, although the pressure of international economic forces was recognised.

They would wish to recreate, in some form, a national stake in North Sea oil and would wish to reassess national control and ownership in order to expand long term criteria. Mr Orme was sure that technology must be developed to exploit, from existing platforms, the large number of marginal fields which have been identified nearby.

In view of the high costs of decommissioning, North Sea platforms should be kept in operation for their maximum useful life — a move which was seen as being helpful economically to the hard-pressed independents.

As part of Labour's aim to promote development and to create jobs, they would assist in the upgrading of refineries.

'I invite you to bring proposals, to consult,' said Mr Orme, frankly. 'The importance of the private sector is recognised and a Labour government would want to consult with it.'

SNP launch oil jobs campaign

A campaign to save oil industry-related jobs in Scotland has recently been launched by the Scottish National Party in Edinburgh.

National Executive Member, Mr Jim Sillars, told a press conference: 'This initiative comes after a number of reputable organisations have, in recent weeks, spelled out the disaster facing the Scottish onshore oil support industry.

'Sadly, the SNP's forecasts have been proved all too accurate. Job losses have bitten deep particularly in the north-east, but also all over Scotland. Companies in the central belt are suffering, and many rig workers drawn from that area are being laid off. Oil — our single largest manufacturing industry — is in a needless slump.

'The greatest political scandal in Scotland is the deep, paralysing silence by important political and industrial institutions over the massive loss of skilled jobs in the oil industry.

'The Labour, Liberal and Social Democrat parties, together with the STUC and CBI, seem curiously unaware of the folly of Thatcher's policies on one of our most important industries.

'As job losses have mounted, barely a squeak of protest has been heard from any of them. It is beyond belief that they stand witness to the deliberate sacrifice of Scottish jobs.'

Mr Kerr MacGregor, SNP Energy spokesman, said: 'The tragedy is that this crisis need never have happened.

'Production must be controlled and co-ordinated with OPEC — as Norway has now done. Only this approach will lift and stabilise the price of oil at around $18–20 a bbl.

Enterprise oil in proposed merger

Enterprise and ICI have agreed on the terms of the merger of ICI's oil and gas interests into Enterprise in exchange for new Enterprise shares.

The transaction combines two financially strong and complementary businesses with resources to develop as a major force in the independent oil and gas sector, they announced on 16 December.

They will have: secure producing interests in the North Sea; a robust programme of new developments in the UK and overseas to provide production in the next decade; and an extensive portfolio of North Sea and overseas exploration interests to generate discoveries in the future.

ICI will benefit a significant position in the oil and gas industry for the longer term. Enterprise will achieve a material increase in production and reserves.

Petroleum Bill to provide for abandonment

The Petroleum Bill, which will regulate the abandonment of offshore oil and gas installations and pipelines has recently been published. The Bill also amends legislation dealing with the petroleum royalty regime; designation of offshore safety zones; authorisation procedures and insurance for onshore pipelines; extension of offshore licensing to UK territorial waters off Northern Ireland.

The Bill will enable Mr Peter Walker, Secretary of State for Energy, to require for his approval costed programmes for the abandonment of offshore installations and submarine pipelines. He will also be able to require evidence that funds will be available to meet abandonment obligations.

Regulations on abandonment will cover removal and safety standards, specify anti-pollution requirements, and provide for inspection checks on work carried out on the approved abandonment programmes.

In moving the second reading of the Bill it was pointed out that abandonment was not an immediate practical problem. Not until the early 1990s is it likely that the first installation will come to the end of its life and steps need to be taken to remove it.

However, as there is no provision for abandonment under current legislation, it is important to set standards, to deal with submission and approval of removal plans or to prevent default from removal obligations. The Bill is designed to enable action in these particular areas.

With the cost of removal involving huge sums of money the interests oil companies, the taxpayer, the shipping industry and fishermen have to be taken into account and the government has sought to strike a balance between them.

British Benzol joins retailers

The first sites of a new chain of self-service petrol filling and service stations have recently been opened by British Benzol plc. The company has plans to develop a nationwide chain of stations which will embody many new ideas in petroleum retailing including extensive convenience shops, the sale of bagged coal, smokeless fuel and charcoal products, and a wide range of Benzol lubricants.

A group of petrol filling and service stations in Greater London was recently purchased by JC Abbott & Co Ltd, the operating subsidiary of British Benzol, from Motorcrown Petroleum. Further sites, also in Greater London and South East England, are currently being sought.

Dual crane lifted jacket study

Atkins Oil and Gas Engineering has commenced work on a joint industry funded project to study dual crane lifted jackets for application in the North Sea.

The objective of the study is to establish the limitation for lifted jacket design in terms of water depth, topside facilities, weight and vessel capacity.

The work is programmed to be completed in about seven months at a value of £150,000 to £175,000. Shell, BP, Texaco and Statoil will participate in the work subject to execution of the agreement. Shell will make documentation available to the project resulting from the Gannet Satellite conceptual substructure design, which was performed by Atkins. Each of the other companies will contribute a fee of £25,000.

Kuwait Petroleum International has recently been converting a network of several hundred service stations throughout the UK, which it acquired from Pace, Roberts and Sadler last year. Shown above is one of the newly converted Pace Petroleum stations at Bradford-on-Tone in the south west of England.

£1m marine fuel research

The £1m second phase of a major marine fuel research programme is now underway. The project, initiated by Lloyd's Register and with the active participation of 20 major European companies, is designed to make a major practical contribution to the reliability and efficiency of shipboard machinery.

While the EEC is providing some 25 per cent of the project costs the remainder is being contributed by LR and the industrial participants which include ship owners, engine manufacturers, oil companies (including BP, Elf, Mobil, Shell and Total) and fuel treatment equipment manufacturers from the UK, Denmark, France, West Germany, Greece, Holland, Finland and Sweden. The UK Science and Engineering Council is also supporting the project.

The main reason behind the research is the variable quality of residual fuel oils available for bunkering. Based on refinery cracking processes, these fuels are commercially available blends made from primary and secondary processed stocks to no rigorous specification. Consequently marine engines must adapt to the variable quality of these fuels.

Phase 1 of the project, which has already been completed, was mainly concerned with the characterisation of residual fuels. This second phase has two main objectives. The first is to develop an integrated diesel engine simulation capability for predicting engine performance with variable quality fuels.

The second objective is to use the engine simulator to design a new Fuel Management System. This will automatically control such engine operating variables as injection flow rate and timing, charge air temperature, turbocharger characteristics, and so on, to optimise performance and reliability in relation to specific fuel classes.

Some 30 test fuels, specially blended by the oil companies, will be tested on a wide range of production engines manufactured by MAN-B&W, Ruston, SEMT Pielstick and Wärtsilä.

Multi-racial move from BP

BP South Africa (BPSA) has called for the abolition of apartheid and is prepared to put up about £30m for two projects which are designed to eliminate racial divisions.

One of these is to promote multi-racial education in South Africa by financing state schools in Cape Town which want to go private and therefore be able to admit pupils of all races.

The other is to rebuild District Six in Cape Town as the country's first non-racial residential and business area. District Six — a Coloured residential area — was demolished by the government in 1966 and its inhabitants forcibly resettled further out in the suburbs of the city. The rebuilding of District Six would not be possible without government approval.

The projects would be handled and financed by BPSA along with other like-minded organisations and companies.

BPSA advocates changes in South Africa's laws and constitution which would lead to universal adult franchise, common citizenship for all South Africans, peaceful negotiations towards a just constitutional settlement, freehold rights for all South Africans, freedom of movement, equal education, freedom of association and free access to the economy for all within the framework of private enterprise.

New offshore engineering company

The initiative of three experienced offshore engineering companies has led to the formation of an operational new company, Foster Wheeler Petroleum Development and Associates Limited, that offers a unique capability to the British offshore industry.

Formed by Foster Wheeler Petroleum Development, Ferranti Offshore Systems and Wood Group Engineering Limited the new company offers a new approach to cost effective solutions for field development and the economic recovery of hydrocarbons.

The new company will operate in the UK and is initially aimed at new field developments where the application of the diverse and novel technologies can be most effective.

The venture has a single management structure and will provide the experience, new technology and proven capability of the parent companies through project teams that will be seconded to specific projects as required.

Letter to the Editor

Sir,

The article by Ken Linton published in your September issue, "The Changing Face of Service Station Forecourts" contains a number of inaccuracies which lead to a misleading and incomplete picture of the current situation on the forecourt.

Mr Linton's article gives the impression that only Avery Hardoll and Tokheim multi-hose pumps are to be found on sites in the UK. In fact Dresser Wayne Quadro and multi-grade pumps were among the earliest of these types to be installed.

It was Dresser Wayne who spearheaded forecourt credit card readers with Tokheim in the UK over two years ago, followed closely by the Dresser Wayne Bank Note Terminal. The first combined note acceptors/card readers installed in the UK were supplied by Dresser Wayne. Dresser Wayne units are in use on sites throughout the UK.

Similarly, Dresser Wayne were one of the first to introduce automated credit card handling in the kiosk to the UK, again over two years ago.

On the subject of inaccuracies I should also like to let Martin Smith know that the first six Traveller's Check sites he mentioned were being equipped with Dresser Wayne Quadro and multi-hose pumps during September, at the time of publication of the article.

They were originally equipped in April with Dresser Wayne duos to test the concept, and it was these pumps, not the ones at Traveller's Check Whitehouse, which were the very first in the country to be equipped with colour coding.

Yours faithfully,

Colin Goodman, Sales Manager.
(4th December, 1986).

Subsea Petronella—the shape of things to come offshore

Commenting on the completion of commissioning and testing of the Petronella subsea field Dr William Doyle, Managing Director Exploration and Producing, Texaco Limited, said: 'The Petronella development further demonstrates the cost effective approach provided by the Texaco pioneered subsea technology. The technology allows Texaco to use an existing platform to produce these reserves. This is tremendously important in developing the full potential reserves in the area of the Tartan field, especially in today's economic climate.

'Although the temporary agreements of OPEC have brought some improvement in the actual price level the degree of uncertainty must be considered as very high,' he said. 'For the next few years I doubt that new developments will proceed unless they are economically sound at a $15/bbl oil price and at least returning the investment plus financing costs at $10/bbl or lower. This only allows for development cost $5/bbl.

Subsea group

'This means that satellite developments using existing infrastructures are the most likely to proceed in the medium term. Even here there is need for new cost reducing technology which will result in an increasingly important role for subsea technology over the next few years. I am encouraged that the formation of a Subsea Group and appointment of a chairman to that group by the Offshore Energy Technology Board is a signal for improved co-ordination and co-operation on development in this important area.

'While deep water developments may be important in the future, for the present new technology development should concentrate on reducing development costs, offshore manning levels, and maintenance costs in the ordinary water depths in which we now operate. No doubt much of this technology will also benefit deep water development when its time comes.

'UK North Sea is where this technology is most needed and opportunities for applications and rewards waiting. There are over 90 undeveloped oil and gas discoveries within 20 miles of existing fields. This is a rich opportunity for the offshore support industry operating in the UK to make technical advances which can be reduced to operational practice quickly with rewards for the oil companies, offshore support industry and government, and provide employment for the people who work in our industry.

'These developments, coupled with the ongoing base load of operational and maintenance related expenditures exceeding £6 million/day should provide substantial opportunities for the strong, well run UK company to not only survive but sharpen its competitive edge in the international market place.

'Under present government policies we can expect exploration activity to continue to resist, to a large extent, the decline seen elsewhere and position the UK to use this new technology to take full advantage of the existing infrastructure, as well as identify and evaluate more substantial stand alone development prospects for early exploitation when supply and demand are in better balance.

Fiscal support advocated

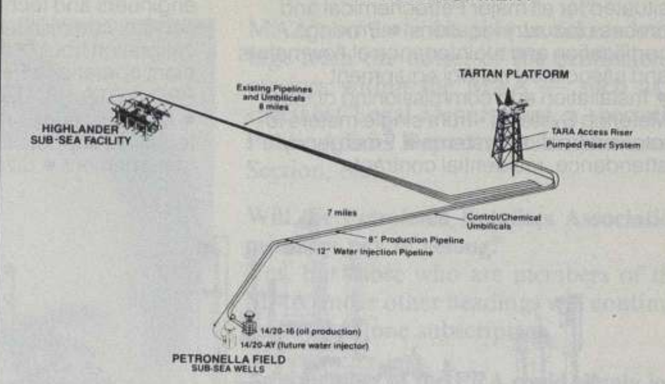
'I am a strong supporter of the encouragement which government provides for exploration and appraisal expenditures. I am an equally strong advocate of similar fiscal support to encourage the development of new technology which not only allows more oil to be won but also will strengthen the competitive ability of the UK offshore support industry. Re-investment of some of the Petroleum Revenue Tax in technology development would return benefits in employment and export of services from the UK. The benefits of re-investment of PRT in exploration have been proven. This excellent idea should now be applied to technology development when it is so urgently needed. Unless action is taken to accelerate and encourage this development, the industry will suffer further losses of those critical skills which are vital in developing this technology.

'There are any number of specific projects which I could refer to as examples of the need for new technology, but I will focus on one area where I believe the potential benefits are enormous.

Big potential

'The major restrictions in extending Texaco's Highlander and Petronella technology for subsea developments out beyond a 10–20 mile radius are the problems encountered in transporting the oil/gas/water mixtures produced from a subsea production facility, processing this mixture on arrival at its destination and accomplishing these two activities, transportation and processing, without adversely affecting the productivity or ultimate recovery of oil from the field reservoirs. High priority should therefore be given to projects which address these problems.

PETRONELLA FIELD DEVELOPMENT



'Considerable work has already been done on developing two-phase subsea pumps, but much remains to be done before these developments will live up to the promise of considerably extending the range for tying in subsea developments. Alternatively, subsea separation of oil, gas and water at the producing field site is a realistic potential solution to the problem of producing remote subsea fields at considerable distances.

'Subsea multiphase metering systems, capable of remote operation, combined with either multiphased pumping or subsea separation of produced fluids and gas would allow combination of multiple subsea fields at considerable distances from the mother platform.

'Such a combined network of subsea fields would greatly decrease the cost of offshore platform processing facilities, manning levels and pipeline costs.

Optimism on lower costs

'Extension of the above concepts to their limit suggests an ultimate goal for subsea technology to be offshore production without the need for offshore platforms. This goal and the more immediate goal of lower cost developments building on existing infrastructure may not be so far away with increased co-operation within the industry and more favourable tax treatment of offshore technology development.

'In conclusion, I am optimistic about the progress which the industry can make in reducing costs, and accelerating new developments with relatively small additional assistance from government in the form of Pre-Annex B tax relief and encourage the Minister of State for Energy, and his assistants in the Exchequer, to give favourable consideration to this opportunity.'

Another North Sea first

The Rt Hon Alick Buchanan-Smith, MP, Minister of State for Energy, paid tribute to the technological co-operation between Texaco and the UK offshore supplies industry and its pioneering of a range of technical innovations which heralded 'the shape of things to come' for future marginal developments requiring subsea facilities.

'Following the success of the Highlander project last year, in spite of the drop in oil prices, Texaco has used its subsea experience with Highlander to bring on stream another subsea development. Many UK companies who secured contracts on the Highlander project have again been successful in winning orders for the development of Petronella.

'In addition to the subsea technology developed for Highlander, Petronella has enabled Texaco to score another North Sea First — the weld inspection of the pipeline by a real-time radiography system. This system has been developed by Oil Inspection Services in a project sponsored by my Department.

'The problems of producing oil and gas from the North Sea were graphically highlighted two weeks ago by the discovery of a cracked weld on the Claymore branch of the Flotta pipeline. I commend the rapid response by the companies investigating the leak: this demonstrates the concern of the industry in trying to minimise pollution.'●

Petrol retailers form a new national body

David Gent, Director General, MAA

Bruce Petter, Director, PRA

A Petroleum Retailers Association was established in the UK on 1 January. David Gent, Director General of the Motor Agents Association — the parent body — discussed its aims in a recent interview with *Petroleum Review*. He said:

- The new body will be involved in forecourt technology and may commission university research into the components of petrol; currently they are wishing to find if unleaded petrol has any effect on old storages at small petrol stations
- It was doubtful the major profitability from petrol retailing could come from selling non-petrol-related items in the forecourt shop in the long term

Geoffrey Mayhew: Why is the Petroleum Retailers Association being formed at this time?

David Gent: Because the MAA found that of its 6,000 petrol retailer members just over 5,000 of them sell petrol alongside other retail motor trade activities. Market research into the reasons why our membership for petrol only retailers was small showed clearly that there was a suspicion of the MAA as an organisation dominated by those who sold or serviced vehicles.

In these circumstances we felt it right to offer the petrol retailing industry what the same market research showed they really wanted: an association dedicated to petrol retailing and effectively run by petrol retailers for petrol retailers.

Will it be autonomous?

On all matters concerned with petrol retailing, yes. The reason for the qualification is that members of the new PRA will also be members of the MAA (and organisationally it is part of the MAA), so as to be able to take advantage from the outset of the professional services within the MAA — such as a specialist Legal Department, a specialist Public Affairs Department, an Economic Section, etc.

Will the Petroleum Retailers Association members pay to belong?

Yes, but those who are members of the MAA under other headings will continue to pay just one subscription.

So a member of the PRA could simply join the PRA and not the MAA, should he so choose?

If he is a petrol only retailer he will join the PRA. For legal purposes he will also be a member of the MAA, but that is purely a matter for his voting rights in the overall company, MAA Limited, because all our petrol retailing activity will be conducted under the auspices of the PRA and controlled by the PRA Executive Committee.

That might mean that a lot of retailers, perhaps small ones who do not belong to the MAA, will join your PRA?

People who join the PRA who have other retail motor trade activities will be expected to bring those activities, if they qualify, into the MAA within two years, but you will find that there will be really relatively few such cases, because we probably have in membership already most of the people who sell petrol alongside other qualifying retail motor trade activities.

Where we are weak, or have been weak, and where there is no other effective representation is in the area of the petrol only retailer. This is what the PRA is designed to remedy.

How many big and small petrol retailers, or sites, as it were, would you see belonging to the PRA during the next year?

During the next year — that is an impossible question, because obviously there will be a certain amount of intelligent observation by some potential members, both large and small, before they commit themselves, although our market research indicates that there is wide-spread recognition of the need for effective collective representation, and therefore we hope that the initial degree of interest will be large.

Taking the longer term view, the MAA already has in membership about a third of the number of petrol retailing outlets that most forecasts expect to be in existence in about five years' time.

In any industry, and particularly one

IP Energy Economics Group

The following meeting will be held at The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, at 5 for 5.30 p.m.

January 19 **The Troll Revolution** Mr James Ball, Editor, Int'l Gas Report

Please contact Ms G Douglas on 01-636 1004.

'We are not seeking in our relationship with the oil companies to go in with six-shooters firing'

as fiercely competitive as petrol retailing, there are always a number of non-joiners, but I would be very disappointed if the PRA did not in due course at least get two-thirds representation.

Has the marketing scene affected this decision?

Yes, it has affected the timing. The fact that so many petrol companies are quite clearly re-appraising their retailing policies, and particularly their licence and franchise arrangements, had a direct effect on stimulating the degree of interest in more effective representation from MAA members and some at present not MAA members' which led to the formation of the PRA.

Could you give an example of how the PRA will work, the sort of things it will engage itself on in its early days?

One of the things that it proposes to do in discussions with members — not only at the PRA Executive Committee level but through the regional committees we shall be establishing — is to establish a list of desirable improvements in petrol retailing licences. We shall then start a round of discussions with individual oil companies with a view to persuading them to recognise the case for these improvements and to consider incorporating them into their own licence policies.

Alongside this we are looking at the idea of scoring existing and future petrol company licence arrangements so that we can show a performance rating against the PRA's desired objectives for licence improvement.

What sort of points would be included there?

For one thing, we feel that the period of notice, normally three months, is unrealistic in relation to the degree of financial responsibility which a licensee is required to undertake these days, and irrespective of the general notice period, where a petrol company wishes to redevelop a site, planning and other considerations, including the petrol company's own decision-making time frame, mean that they will have reached a decision to redevelop the site at least six months prior to the date on which they wish to acquire vacant possession. Therefore in the case of redevelopment notice alone, we cannot see that there would be any disadvantage to oil companies in generally giving six months' notice, but obviously the details of these things are something that we shall need to further discuss with PRA members, because that illustration reflects some of the staff thinking that will be used to stimulate the general discussion on that aspect.

One general point I would like to make is that we are not seeking in our relationship with the oil companies to go in with the six-shooters firing. Yes, as necessary we will be a courageous and vigorous public advocate of petrol retailer positions and criticisms, but we believe that people are persuaded most by rational and unemotional argument, and in each area where we have criticisms of individual companies or wish to suggest changes in current practices, we shall first seek informal discussions with them on those changes and we would hope to base the PRA representation in those discussions on brand councils or committees so as to ensure that we are not in any circumstance asking an oil company to discuss its policies other than with people who have an equal interest in maintaining the competitiveness of the particular brand in the market place.

How would you deal with the issue of confidentiality, which in business terms is often very important?

This is where the ongoing association with the MAA would I hope help to generate confidence, because the MAA is quite often effective in helping the motor vehicle dealer councils resolve problems with manufacturers, and we have a long tradition of maintaining confidentiality in those circumstances, which is recognised and respected by both the retailers and the manufacturer or importer in the individual vehicle franchises.

How will the regional structure work?

Here again is where the MAA association helps, and I might add that the group of retailers we got together to discuss the concept of the PRA did look at the idea of a more independent PRA before deciding on the present arrangement, and the fact that the MAA has a structure of regional offices was felt to be a distinct advantage. Some of these regional offices have already organised Petrol Retailers committees, and on the back of this experience it will be an immediate task of the PRA to establish PRA petrol retailer committees in each MAA region, and the chairmen of these committees will be *ex officio* members of the PRA Executive. Of course, we shall service them through the MAA regional staff, but of the area managers in each MAA office, we are asking one to take an increasing specialist interest — and a lot of them have past petrol retailer experience — in petrol retailing, and would hope and intend, as the PRA membership expands, to achieve a situation in which in each region there is a dedicated full-time PRA man.

Apart from the security of tenure aspect, will the PRA be looking at technology on the forecourt?

Yes. There are two important initial areas. Firstly, stock losses. We have recently, under the auspices of the MAA, done an exercise on the influence of temperature variation on stock losses. While this is significant in some localised circumstances, it seems that the general cause is not necessarily that, and we are currently looking at the idea of the PRA commissioning some university research into the volatility of some of the components of the product which our members sell to the public as petrol and its effect on the behaviour of petrol in storage and during the delivery process.

We are also looking at the question of unleaded petrol, because while it would seem from exercises done by the oil companies that there should be no problem in putting unleaded petrol into the more recent tanks and pipelines, work done by at least one of the independent oil suppliers has suggested that for some of the older installations — and this can apply particularly for the independent dealers — there could be some sealant problems, and this needs to be looked at further, for obvious reasons.

The idea of research inspired by you is a fairly new one?

Yes, I think it probably is.

What sort of university would you be approaching?

I am not prepared to say which at the moment, but let me put it this way: we have found that there are a number of universities that have relevant expertise.

And presumably within what you can afford.

Yes.

What about automation and electronic developments? For example, there is hope of a national credit card system — but which is having problems. Would the PRA have an attitude on that?

The MAA and PRA have been talking to the representatives of the clearing banks, EFTPOS (Electronic Transfer From Point Of Sale) Committee for some time, because there is a common interest amongst MAA and PRA members in such a facility, although by virtue of the price of petrol and the greater frequency of the transactions, probably the PRA interest is more immediate and it has relatively more substantial economic implications for the site operators.

Are you keen on it?

I did not say that! I said that it had substantial implications, which we and our members need to look at very carefully. As you know, there are a number of approaches. There is electronic reading of credit cards, in some cases allied to direct communication with the credit card company computers, in others just as a stand-alone operation to assist processing of cards at the site.

Then there is the related but from the retail customer's point of view less attractive prospect of actual direct debit of the customer's bank account, so that the extended credit available to retail buyers through the present credit card systems is dispensed with. I think it is going to be a relatively difficult decision for both petrol retailers and oil companies which of the horses to back. You could say that in the longer term, in terms of reducing overall business costs where the cost of money is one of the major components, the pure EFTPOS direct debiting arrangement offers the most, but in the meantime we do have to consider the retail customer reaction, and quite clearly those concerned with managing the present credit card operations are going to fight hard to preserve their corner of the market place.

The high cost of all operations is one of the big factors these days. Will the PRA be thinking about costs?

That part of the MAA activity which the PRA will inherit has been thinking about this for some time. For example, we have done, with members in the various regions, a number of analyses of licensee costs, and have used these and continue to use them as a basis for ongoing representations to individual oil companies to review the terms and the margin available to licensed site operators. The extent to which representations by the MAA/PRA and others have been successful is illustrated by the fact that there are significant differences between the levels of margin available to retailers of some brands as compared with others.

Obviously we shall continue that emphasis.

Furthermore, I personally think that it cannot be sustainable in the long term that the major profitability from petrol retailing should come from the sale of non-petrol-related items in the forecourt shop for two reasons: one is that site operators will increasingly give more attention to the sandwiches, flowers, garden furniture and sweets because that is where their profitability comes from, at the expense of the element of service of greatest interest to the petrol companies or oil companies, which is the actual service to the motorist who buys that particular brand of petrol; secondly, because I believe that the traditional retailers are going to start hitting back at these forecourt shops, and I think that it would be unrealistic therefore to regard these as a longer term easy option when it comes to site profitability. ●

A debate at the highest level on the oil price collapse

Conflicting views on the effects and implications of the collapse in crude oil prices were strongly expressed at the 1986 Institute of Petroleum conference on Oil Supply and Price.

The international speakers were: Mrs Helga Steeg, Executive Director, International Energy Agency; and Dr Fadhil J Al-Chalabi, Deputy Secretary General, Acting for the Secretary General, OPEC

- Dr Fadhil Al-Chalabi advocated the need for a price defence mechanism in which OPEC and other producing countries would co-operate in achieving a balance between supply and demand, an $18 barrel of oil appearing to be unanimously acceptable

- Mrs Helga Steeg said: 'I simply do not believe that any kind of mechanism, be it formal or informal, can be devised between OPEC producers and non-OPEC producers, including the IEA member countries, which will stabilise price. This is not a matter of dogmatism or ideology, it is simply a matter of non-existent practicalities.'

Mr Russell Seal, General Manager, Supply and Trading, BP Oil International, thought producers might consolidate recent moves into the downstream to add value to crude, while Mr Joe Roeber, Joe Roeber Associates, saw formula pricing as an increasing factor

Dr Paul Frankel, CBE, President, Petroleum Economics, and Mr Robert Mabro, Director, Oxford Institute for Energy Studies, in an open discussion, agreed that while commodity agreements died, other always came to take their place

Mrs Helga Steeg, Executive Director, International Energy Agency, gave a *Global view of current and future prospects for the OECD countries.* **She said:**

A great many myths about energy and oil markets have been exploded in recent years. Among those the notion that energy supplies would become progressively tighter throughout the rest of the century, without any return to supply abundance. Long-range forecasts pointed to ever-rising prices, intensified development of high cost energy sources, and a scramble to maximise production.

Few, if any, experts in the 1970s believed that energy consumers could adapt so thoroughly to the pressure of high prices that the energy scene would be transformed, confronting governments and industry with a whole new set of problems — and opportunities too. The so-called energy glut of today was scarcely considered as a realistic scenario. Most forecasters failed to predict current conditions of intensified price competition between energy suppliers, the problems of profitability and capital financing, and the protectionist pressures.

Forecasters do appear to have learned the lesson. They have become more humble and less dogmatic — at least for the moment. All of us recognise that making projections of energy supply and demand is an extremely hazardous business.

First, a brief step back into the recent past. The oil price increases of the 1970s and early 1980s, which drove OPEC's official price to a peak of 34 dollars per barrel in October 1981, are clearly at the root of the present situation. Falling demand and growing production in OECD countries have resulted in surplus supply capacity for every major fuel and form of energy. One set of figures with which you are all familiar will suffice to illustrate the scale of the change. The call on OPEC oil by the rest of the world was nearly 32 million barrels per day in 1979. That requirement had been reduced to just over 17 million barrels a day by 1985. There is now excess production capacity in the world market of seven-to-ten million barrels of oil per day.

Looking back, it is fair to say that the extent to which consumers were both willing and able to resist high prices was underestimated. So too was the resolve of governments in the IEA countries to look to their long-term energy security by encouraging diversification of supply sources and energy efficiency, and by opening up energy trade and inter-fuel competition. Indeed, that miscalculation of the impact of market forces, particularly when they are flanked by government policies, probably explains the erroneous forecasting of the 1970s. A central lesson of the recent past is that basic economic forces governing supply and demand, particularly for oil, can be held in check only temporarily by artificial devices imposed by governments.

Price fall beneficial

Now for the present. OECD, and I agree, consider the fall in oil prices to be beneficial. Some of the benefits will only be brought about in 1987. The IEA Secretariat has been hard at work throughout this year on an appraisal of the possible longer-term impact of lower oil prices on supply and demand. This sensitivity analysis was based on a broad series of working assumptions about prices. For the sake of this discussion, let us assume that today's relatively low prices will be with us for some time because of the persisting overhang of excess capacity, and that a gradual increase in real prices begins to make itself felt in the 1990s.

On the demand side, the IEA's Secretariat considers that there is likely to be fairly moderate growth both in the immediate future and beyond. Certainly this assessment is borne out by the record for oil consumption so far this year, with a growth rate of a little over two per cent now expected for the whole of 1986. We have revised forecasts downwards. Next year, at current prices, growth in consumption is projected to be smaller, partly because some of the market share gained by heavy fuel oil, mainly in the United States, will probably be lost again to natural gas. For the next few years we see rising oil demand coming mainly from the transportation sector rather than electricity generation and industrial use. Looking at a period ahead of say four years we again do not see more than a moderate growth in demand for oil, perhaps bringing OECD oil requirements by 1990 up from 34.8 million barrels a day in 1986 to somewhere in the range of 37 to 38 million barrels a day. By way of comparison, consumption reached a peak of about 42 mbd in 1978. Barring unforeseen circumstances, it does not seem to us likely that consumption will exceed that level during the rest of the century, although it may come close by the year 2000.

The speakers at the Institute of Petroleum's 1986 Oil Supply and Price conference on 27 November, held in the IP Lecture Theatre. From left, seated: Dr Paul Frankel, CBE; Mrs Helga Steeg. Standing, from the left: Dr Fadhil J Al-Chalabi, Mr Robert Mabro, Mr Russell Seal and Mr Joe Roeber

Growth rate: 1 pc

Over the medium term, we see the current rate of demand growth, that is about two per cent or more per year, continuing. Over the longer term, that is between now and the year 2000, the rate of growth in oil demand in the OECD area could average one per cent per year, provided our assumptions that prices will rise again in the 90s materialize. Of course estimates that far ahead are surrounded by uncertainties. Whether this view is borne out will depend on consumer behaviour and the progress of conservation.

There is even more uncertainty about supply trends. Looking first at the OECD, it should be remembered that even at much higher oil prices, OECD oil production was expected to fall gradually, because of declining output from older fields, mainly in the United States, and also in the North Sea. Geology, as well as price, has its part to play. Of course, low prices in the 1980s can be expected to have a delayed effect on production, which would begin to show up during the 1990s. Again because of the delayed effect, rising prices in the 1990s would not immediately stimulate production. If lower prices persist in the medium term with a gradual rise thereafter, OECD oil production by the end of the century could be 1–1.5 mbd less than would otherwise have been the case. Outside the OECD, there is a contrasting production picture. Because of their more favourable reserve position, non-OPEC developing countries' oil production is expected to rise over the next 15 years under most price scenarios.

Concern over lower activity

Much of the IEA's attention is now focused on upstream investment and activity, and it seems particularly difficult to form a judgment on how relatively lower prices will affect this sector. Furthermore, as was clear at the World Energy Conference a few weeks ago, the experts differ over the prospects for oil reserve additions. But there is little disagreement that a continued decline in upstream expenditure would further reduce the chances of finding major fields. And our analysis shows that exploration and development expenditure in 1986 will on average be about 30 per cent below 1985 levels. Cost savings in the upstream sector, due to reductions in the cost of equipment, interest rates, joint ventures and to technological improvements can to some extent offset the fall in expenditures. But there is some concern that a continued lower level of activity will further limit the chances of finding major fields and reduce the capability to bring fields on stream quickly.

A few words now on the OECD's requirements for oil supplies from outside the area, which are bound to increase in any event. Increased demand and lower production as a result of lower oil prices and other factors, for example, exchange rates, would obviously tend to make that rise more pronounced. You will note that I am talking about oil requirements, not about the likely conduct of producers, a subject on which I am not willing to speculate.

Higher demand and lower OECD supply might increase OECD dependence on outside sources of oil, which in 1985 was about 50 per cent, and which might thus rise to around 60 per cent by 2000.

More flexibility

A superficial conclusion from this estimate is that OECD energy economies will inevitably become as vulnerable as they were in the early 1970s. It could be argued that this would happen as oil import dependence increases to the levels of those difficult times. And it is true that higher imports, which must mainly come from the Middle East, are bound to affect energy security. But we will in fact be less vulnerable than in the 1970s, because now we are much

(Continued overleaf

better prepared to deal with supply disruptions and their effects.

Government stocks, virtually non-existent at the time of the first oil shock in 1973, now stand at 43 days of net imports and are on the increase. Together with company stocks, they add up to a total of 184 days net imports. There is much more market flexibility, and there are many more alternative suppliers, both of oil and other forms of energy. Dependence on oil has been greatly reduced, particularly in electricity generation and industry. IEA governments have a finely-tuned emergency system at their disposal, providing for oil sharing and demand restraint.

So that is the overall outlook according to our analysis:

- Moderately rising oil demand, possibly tapering off to a lower rate of increase in the 1990s;
- declining production in the OECD;
- reduced exploration and development, particularly in high-risk areas;
- and the inevitable closing of the gap between available supply and consumption.

And against the prospect of dwindling oil supplies we must also expect demand for total energy to expand with economic growth. Our projections are that total primary energy requirements could increase between now and the year 2000 by almost one quarter. Oil will remain the single most important energy source in the IEA countries for the rest of the century, even though its share in the energy mix will diminish.

It all adds up to tighter markets once again in the 1990s, and inevitably to increased dependence on imported oil.

No protection

Now some policy considerations. Our analysis underlines two points: First, the IEA's promotion of diversification of energy supplies, of conservation, of research and development, and of increased energy efficiency, has produced results. So has the increasing reliance of all IEA Member countries on the operation of open energy markets. The policies were the right policies.

My second point is this: Because the present energy surplus is only a temporary phenomenon, our governments are determined to find ways of maintaining these policies. It is not that easy, at a time when reduced budgets and falling revenues are inhibiting investment, and when the current difficulties of energy supply industries are producing protectionist reactions in a number of IEA Member countries — calls, for example, for the introduction of import fees or domestic subsidies.

I am convinced that those calls must be resisted; and it is reassuring to note that President Reagan's administration is doing just that. Experience shows — and sadly there are many examples — that when one important trading nation sets up protectionist barriers, others follow suit in retaliation. It would be a severe setback were this to happen in the energy sector. The resulting fragmentation of energy markets would distort investment and trade patterns; it would damage the energy sector of other IEA Member countries by making it harder for them to export to the protected market; it would inhibit product trade as well as trade in crude; it would jeapordise the important gains made recently by IEA countries in removing barriers to trade in refined oil products; and above all, it would again raise the cost of oil to the consumer. I believe that IEA governments should be constantly alert for opportunities to remove existing barriers to energy trade and to ensure that no new restrictions are imposed.

Long term security

There is one area in which low oil prices offer a positive opportunity to improve long-term energy security. That is the buildup of emergency stocks. It makes sense for governments which are net importers of oil to take advantage of current prices to add to their stocks when consumption is also increasing. Now is a good time for them to make sure that these inventories are readily accessible in case of need.

Mr Steve Wright, Chairman of the Institute of Petroleum's Energy Economics Group, which organised the conference

I have stressed the uncertainties on the supply side. IEA governments are concerned about the current decline in upstream investment. Inevitably, lower prices will tend to discourage exploration and development. This in turn will reduce the level of future production capacity. This is an area where adjustment of government regulations can undoubtedly help. Several governments are already taking steps to relax regulations which restrict indigenous production. Useful action could include streamlining of leasing and licensing procedures, and the improvement of royalty and fiscal regimes to encourage producers. But I would make one proviso. Government measures, which obviously have to be tailored to national circumstances, should be designed in such a way that they do not distort competition.

Energy policies must also see to it that the momentum of energy conservation and efficiency improvement is not lost. Conservation is, if you like, the great imponderable, and the recent past bears this out. One reason why past demand projections were so widely off the mark is that they failed to take account of the impact of conservation. Spurred by high prices, energy efficiency increased by one fifth between 1973 and 1985. This improvement was offset by continued economic and population growth, resulting in a comparatively small increase of five per cent in total energy demand during this period. In the vital transportation sector, fuel economy improvements ranging from five to 37 per cent have been made in new cars since 1978, and there have also been big improvements in fuel efficiency in shipping and aviation. one has to wonder what energy markets would be like today without the contribution of conservation.

Efficiency improvement needed

For the future, there remains a large potential for further efficiency improvements in all end-use sectors. A study now being completed by the IEA shows that if energy efficiency measures which are currently economic were fully implemented by the year 2000, energy demand would be considerably lower than it would be without any efficiency improvements. The study also says that the main contribution to promoting energy efficiency over the rest of the century is likely to be made by the commercialisation and diffusion of existing technologies rather than new technologies currently the subject of research and development programmes. Government action to reduce or overcome market limitations by improved information, training and management, and the alleviation of fiscal or institutional obstacles would all help.

Nuclear power implication

Although this talk has concentrated mainly on the outlook for oil, and on policy issues directly related to oil, it would be incomplete if I did not take up another matter of intense political debate in many IEA Member countries. I refer to electricity generation and the role of nuclear power. The Chernobyl nuclear reactor accident has again raised fears in regard to nuclear safety, with resulting calls for the phasing out of nuclear power. Nobody can doubt that considerations of human safety must have priority over all other considerations, and that everything possible should be done to limit risks and improve safety provisions. Whatever decisions individual governments may make about nuclear programmes must be in full awareness of all the energy policy, economic and social implications.

Today, I would like to look briefly at this particular controversy in relation to oil consumption, leaving aside many other aspects of the nuclear debate which are beyond the immediate scope of this conference. It should not be forgotten that nuclear power programmes were part of the answer to the oil crisis of 1973–74, a response to the urgent need to reduce our dependence on oil and to diversify energy sources. One thing is abundantly clear: to switch from nuclear energy to oil in electricity generation would cancel some of the most important improvements in our energy economies achieved in the past 12 years, and would increase our dependence on Middle East oil. So any switch away from nuclear power generation would have to be primarily to coal-fired power stations, since there is no realistic hope that renewable energy sources can fill the gap to any significant extent. Even taking account of the encouraging technological progress in the area of clean use of coal, there are serious environmental problems involved in resorting to coal as a substitute for nuclear power.

Discussion of the nuclear issue brings me to more general environmental considerations. The relationship between environmental concerns and the need for energy increasingly preoccupies IEA Member governments. They recognise that production and use of energy have major impacts on the environment. As a result, very considerable investments have been made in all Member countries of the IEA to reduce emissions of fossil-burning power plants, to improve the safety of nuclear power, and to reduce pollution by motor vehicles.

Conclusion

To sum up: The turbulence of energy markets in 1986, the changes we have witnessed in OPEC, the persisting surplus capacity of all the main energy sources, the Chernobyl effect — all these changes have done nothing to modify the central energy policy objectives of the IEA. We must continue to be aware that eventually we will have to rely more and more on the Middle East, and particularly the Gulf region, for our oil supplies. The sharp fall in prices should make us even more vigilant, and we should be quick to recognise, and if possible work against, trends that could one day increase our vulnerability. This applies to any excessive increases in consumption, and to falling investment in energy production and conservation. At the same time, we should preserve what has been gained in the freeing up of energy markets, and continue to encourage the dismantling of remaining barriers to energy trade.

Long view

It has to be recognised that the maintenance of coherent energy policies directed at long-term supply security is much more difficult in times of abundant supplies than, let us say, in the immediate aftermath of an oil crisis. That is the challenge facing the IEA at the present time. Our Member governments have to resist the temptation to allow short-term political expediency to cloud their awareness of fundamental and long-term realities. They have maintained the long view of energy policy for well over a decade now, with impressive results. I am confident that they will continue to do so. ●

Dr Fadhil J Al-Chalabi, Deputy Secretary General, Acting for the Secretary General, OPEC, has provided *Petroleum Review* with the following article based on his talk to the Institute of Petroleum's Oil Supply and Price conference

The prospects for oil producers from an OPEC point of view

by Dr Fadhil J Al-Chalabi

The remaining few years of this decade will be crucial not only in shaping the world's energy balances in the 1990's but also in determining the socio-political developments in the oil-producing countries and the supplies outside OPEC. Moreover, events in the next few years will have a bearing on the balanced growth of the world economy. Any decisions taken today, therefore, will have a far-reaching impact on the future world economic and energy situation.

Overhang

The world is presently living with an overhang of oil over-supplies which is not likely to disappear in the near future. Additionally, demand is not expected to grow so much so rapidly as to absorb the large excess production capacity which now exists within OPEC. Whilst, officially, OPEC is limited to producing 17 million barrels per day, i.e. something like half its actual production capacity, effectively the production could be less and, with the end of the hostilities in the Middle East, the overhang of over-supply would be even greater. This situation not only makes the price inherently fragile and weak but its defence extremely painful, a defence which should, in any event, not be expected from a single group of producers, but through the wider cooperation of producers inside as well as outside OPEC.

Disastrous prospect

The last ten months have shown that if the oil industry is left entirely to the so-called 'free market forces', competition among producers could bring oil prices down to a range of US$5–7 per barrel. Such a situation would be disastrous for everybody, not only to OPEC Member Countries, whose combined loss incurred in 1986 as a result of the chaos in the market exceeds $50 billion. This year OPEC oil revenues could be something like one-quarter of the peak level of $280 billion reached in 1981: needless to say, with the increasing requirements for development, all OPEC Countries are passing through extreme financial difficulties and turning into debtor countries.

However, the price collapse could be even more disastrous for other producers. It has been seen how oil companies in the US have drastically reduced capital expenditure in the upstream operations. The number of rigs operating now is something like one-fifth of what they had been in 1981. Moreover, there are increasing lay-offs in the oil-producing states in that country and tremendous losses in company earnings — recently it has been announced that the losses of the US oil companies this year is expected to exceed $50 billion. The price collapse could also be disastrous for a producing country like the UK where the cost of developing new reserves is extremely high. Although the operational cost of production in the UK is low and could allow companies to continue selling in the market, the necessary investments to maintain the present rate of production cannot be justified with low prices. Hence, the substantial cuts in the companies' investment budgets witnessed this year.

Likewise, the price collapse is disastrous for the Socialist Countries, in particular the USSR, which depends on oil exports to obtain something like 70–80 per cent of its foreign currency earnings. Similarly, Third World oil producers, such as Mexico, Egypt, Malaysia, Angola and others, which have tremendous external debts and development problems, could suffer enormously from market chaos.

Need for a price defence mechanism

It is, therefore, necessary that some mechanism for defending the price be found, bearing in mind that, in a competitive environment, everybody would like to stay in the market as long as the price obtained covers the operational costs, which are generally very low. Operators do not care about past investments, which are considered to be either sunk capital or recovered capital, nor do they care about future investments to sustain production. In other words, they live for the moment and continue to produce at low prices. The long-term effects, however, are extremely adverse, especially for high cost producing regions; the curtailment of capital investment will inevitably lead to a lower production.

The price defence mechanism lies essentially in regulating production in a way as to achieve balance between supply and demand. However, the problem is, who is going to regulate production? In the past the oil companies were successful in controlling prices at very low levels by regulating supplies to match demand, so that the market was stable and growing fast. When OPEC took over, it pursued a policy of price defence by setting prices at certain levels below which no Member Country could sell its oil and by leaving its production to be regulated by the market. The problem was that OPEC used to set prices at such high levels that the results were self-defeating when the demand for its oil fell sharply from over 31 million barrels per day in 1979 to less than 16 million barrels per day in 1985. This drop in OPEC production was the result of falling demand for oil in general and increasing supplies of oil outside OPEC, so

(Continued overleaf

'The chaos which reigned in the market prior to the OPEC August agreement must already have shown to all producers, within or outside OPEC, how much the defence of a stable price is necessary to achieve a worldwide energy balance'

that OPEC's share in the world oil supply fell from more than two-thirds to less than 40 per cent during this period. Between 1975 and 1985, some 10 million barrels per day of additional supplies from the non-OPEC producing region were added to the non-Communist world oil production, and some 7 million barrels per day were lost in non-Communist world demand as a result of energy conservation and fuel substitution. OPEC was, therefore, left with such a small share that it became extremely painful and difficult for its Member Countries to defend its price.

In the past OPEC had been able to defend a price when its share in the market had been more or less compatible with its needs and could be distributed among Member Countries without creating financial hardship. For example, when, in 1982, the oil production of OPEC was about 19 million barrels per day, OPEC had found no great difficulty in defending the price; hence it was able to maintain its role of a swing producer to defend a price from which others benefited in terms of greater investments in oil and non-oil energy sources. However, when production came down to less than 16 million barrels per day in 1985, the defence mechanism of the price became more and more precarious. The defence of the price had even been possible at a production level of 16 million barrels per day when Saudi Arabia assumed the role of swing producer within OPEC, absorbing the additional fall in demand and allowing the other OPEC Members to produce their full quota, but when Saudi Arabia saw its production fall to nearly 2 million barrels per day during the summer of 1985, that Country made it clear that it could no longer assume the role of swing producer and that its policy was aimed at producing its full production quota as fixed in October 1984. An increase in Saudi Arabia's production was made possible through a market-oriented price mechanism. That in turn, however, then led to a de facto abandonment by OPEC of the fixed price system, which could be defended only by production programming, to more or less a market-oriented pricing policy with the goal of gaining a higher market share.

Prompt measures improved prices

The new policy of higher market share, which could only be effected through price competition, proved to be also very painful, not only in terms of a dramatic fall in revenues but also in terms of socio-political implications. OPEC had, therefore, to take prompt measures to restore the stability of the price, and, hence, to return to the production programme decided upon in October 1984, by just leaving Iraq aside. This step alone led to a noticeable price improvement — with prices at present being in the range of $14–15 per barrel — but proved to be insufficient to restore the price to a higher level. Currently, all Member Countries which are party to the 'interim' agreement of August 1986 have been abiding by their quota; nevertheless, prices are still seen to be weak. It was for this reason, that it was thought something should be done in order to return to the system of a fixed price. After the matter had been thoroughly discussed in OPEC, the figure of $18 per barrel was chosen as it was felt that this level could be considered an acceptable price for OPEC to secure some predictability of revenues for economic and social development. This price could also provide enough cash flow for the producers outside OPEC to reinvest in the industry so that the future world supply balance would not be jeopardised.

On the other hand, it is a price which, in the long run, could activate higher demand, since it is a price from which end-consumers could benefit if it was adequately passed through to them.

Eighteen dollars unanimously accepted

There are indications that this fixed price system at a level of $18/bbl is unanimously accepted. For some Countries it is just a step towards a higher price, whilst for others it is a price that OPEC can defend. The problem is how this policy target can be achieved. A mechanism for flexible production within OPEC is needed in order to defend such a price so that total production could swing up and down with demand in order to secure balance in the market. Such a mechanism is necessary if OPEC alone has to take the responsibility of defending the price, as had been the case in the past. In the present market realities, action must be taken to remove the overhang of supply in the market by reducing the level of production, as a prerequisite to raising the price to the required new level. OPEC has so far succeeded in observing a temporary quota, which is called 'interim' with the understanding that an agreement is to be reached towards a permanent quota. Until such an agreement is reached, some measures should be taken on production, without which balance in the market, as a prerequisite to raising the price, cannot be achieved.

It is also important that within a permanent quota system, once reached, there must be flexibility in dealing with total OPEC production (the ceiling) so as to adapt it to the variations of demand for seasonal or other reasons.

Permanent quota

In dealing with the issue of the permanent quota for OPEC Countries, so many factors which reflect the varied national interests within OPEC must be considered. Member Countries' interests are not the same, as, for example, those Countries with very high financial requirements and absorptive capacity for development, would seek a higher share of a smaller total OPEC production in a way as to allow them to continue to invest in their development, whilst those with very high reserves and less absorptive capacity for development would try to have a higher quota reflecting their proportionate share of reserves and their production capacity. The first category of Countries would put greater emphasis on such socio-economic factors as population, GNP, the local consumption of products, the cost of production, external debts, etc, whereas Countries with huge reserves would put more emphasis on the purely oil related factors.

OPEC has been through this exercise for some time, and it is expected that the Conference will have to take up the discussion on this issue again. Reaching an agreement on a permanent quota may require time, as the problems involved, such as the parameters to be used in setting the national quotas, the weight to be given to each parameter, the mechanism to be applied in order to make the quota system flexible enough to cope with demand variations, are many. Difficult though they are, those issues have to be tackled within OPEC and the discussion on them is still going on.

The price defence mechanism through production would not only require an adequate and unanimously accepted quota system, but also the solution of some other problems associated with the implementation of the quota system. For example, the pattern of marketing oil is not uniform in all Member Countries — some countries within OPEC have greater flexibility in marketing their oil than others. There are Countries with a very high ratio of product exports, whether they are from local export oriented refineries or through refineries outside the territory. Because product prices are not controlled by OPEC, those Countries follow a market-oriented price which makes it easier for them to produce their quota compared to other Countries which have only crude oil to export. Furthermore, there are Countries which still have some of their production lifted under the concession system (equity oil). The fiscal terms of equity oil are determined bilaterally between the host government and the companies, thus the resultant companies' profit margin does not follow a uniform pattern within OPEC and is, in any case, not subject to the OPEC price regime. Moreover, there are certain extra-heavy crudes which are not subject to the OPEC pricing regime, let alone the other patterns of marketing, such as the barter deals and processing deals which put Member Countries in an uneven position as regards marketing flexibility. This is one area which is

'One can hardly reconcile what is being said about the free market forces, on the one hand, and setting political energy targets to be achieved through protectionism irrespective of the price level in the international market on the other. This latter is, by definition, the very opposite to the free trade concept.'

being discussed and for which a solution had to be found, because otherwise the burden of defending a fixed price would be unevenly distributed among Member Countries in a way that could create problems which would obstruct the smooth implementation of the system.

As OPEC is determined to reach the stage of defending the fixed price at this level, the resulting problems which the Organisation will face are awaiting unanimous decisions from the Conference. Hopefully the forthcoming Meeting of the Conference will be successful in this regard, otherwise, and until a final solution is found, the interim quota agreed upon in August could be extended in order to guarantee a minimum of stability.

Urgent need for supply regulation by others

At the same time, however, some sort of production or supply regulation from the other producers is urgently needed in order to help OPEC achieve a policy objective which is beneficial to all. A positive signal from a number of non-OPEC oil producing countries has been given whereby those countries have expressed willingness to cooperate with OPEC in an effort to support the price structure. However, the amount of oil which is committed by them to be taken out from the market is still small and insufficient to help OPEC surmount the difficulties of the price defence mechanism. Moreover, some other non-OPEC producing countries are still adamant in their unwillingness to cooperate with OPEC in spite of the fact that they desperately need a higher price to ensure continued investment in their oil industry — investments without which they cannot maintain their present level of production for long.

The chaos which reigned in the market prior to the OPEC August agreement must already have shown to all producers, within or outside OPEC, how much the defence of a stable price is necessary to achieve a worldwide energy balance. If the price defence mechanism fails in the future, the impact of a new price collapse on the world energy balance will be far-reaching. In the short-run, producers from outside OPEC could continue to sell their oil at a very low price, as was already mentioned. However, given their very limited reserves and the very high cost of developing additions, those producers will end merely by depleting expensive reserves — the replacement of which is very costly — at low prices, whilst OPEC, which is still producing at half capacity, could take whatever incremental demand emerged by using its idle capacity, a situation which might ultimately lead to a greater dependence on OPEC oil in the future. On the other hand, something should be done on the demand side so that free market forces would, at the new OPEC price, lead to an increased demand for imported oil. The IEA countries in their unjustified fear of greater dependence on OPEC oil are currently adopting fiscal policies aimed at preventing the fall in OPEC prices from being fully enjoyed by the end-consumers, ie the so-called pass-through of oil prices in the world market to the end-consumers has been limited. The current price range of $14–15 represents a decline in real terms of more than 65 per cent, if the fall in the nominal price and the substantial depreciation in the value of the US dollar is taken into account. This dramatic fall in the cost of imported oil has not been passed through to the end-consumers who, in most of the IEA countries, are still paying the same price at the pump. The few exceptions are the USA, where the pass-through of the fall in price was the highest in the IEA area (about 33 per cent) and Germany (less than 20 per cent). In many other OECD countries, however, as a result of the fiscal policies of the governments of those countries which aim at grabbing the difference in price for their Treasuries, there has been no change in the price paid by the end-consumers. This policy is being followed under the slogan of preventing new dependence on imported oil, to be achieved through the adoption of fiscal measures which ensure that internal prices for oil products paid by end-consumers are kept at a high level in order to preserve the momentum for energy conservation, the investment in other sources of energy and the investment in oil inside the OECD area.

One can hardly reconcile what is being said about the free market forces, on the one hand, and setting political energy targets to be achieved through protectionism irrespective of the price level in the international market on the other. This latter is, by definition, the very opposite to the free trade concept.

In concluding, trilateral cooperation is necessary to maintain the price stability, ie cooperation between consumers, OPEC producing countries and other oil-producing countries. Those latter could, in the long-run, suffer more than OPEC from any price collapse given the very high cost of replacing a barrel of oil produced say, in the US, by a new barrel, whether through expensive discoveries of new oil fields, through the development of old fields or through very expensive enhanced recovery methods. ●

Downstream moves may be consolidated to add value to crude

Mr Russell Seal, General Manager — Oil Trade and Supply, BP Oil International, in discussing the *Implications and Problems for Oil Companies,* used a number of graphics, produced in following pages.

He said that the unprecedented collapse in prices following OPEC's decision to pursue market share had implications across the spectrum of oil company business, both upstream and downstream and for associated activities.

Predicting the developments of the oil market was more than usually fraught with difficulty as the environment was now characterised by instability and volatility.

The trends of the past would not necessarily continue as lower oil prices took effect on demand and supply. He concentrated on the effects on downstream oil operations.

The first quarter of 1986 saw the dramatic collapse in prices as the fundamental oversupply of oil was exposed. The familiar trend of reduced OPEC production whilst other regions continued to grow came under pressure at the end of 1985 as OPEC moved to regain market share. The effect of this move was for the market to allocate production until OPEC was able to reach agreement on production restraint.

As long as surplus production capacity remains, prices would remain volatile.

With a sustained period of lower oil prices in prospect, oil demand would be stimulated. In the short term, real demand increases were hidden by transient effects such as stock building, however he expected demand growth of around 2% p.a. through to 1990. Coupled with a small reduction in expensive non-Opec production, the demand for OPEC crude would rise.

The drive for market share saw the introduction of netback deals as another form of market related pricing. They were a mechanism for passing the price risk from buyer to seller and completely reflect market forces. He queried what would happen to them in future.

Structural response

The deintegration of oil companies into profit centres would continue as companies concentrated on commercial returns from all aspects of their business. Demand growth would be a significant factor, giving better utilisation rates of downstream refining and marketing assets leading to increased efficiency. Lower stock values reduced the cost and risk of doing business. Companies which remained integrated would need to increase returns from downstream operations and financial pressure on the most vulnerable companies could force them to withdraw from certain markets.

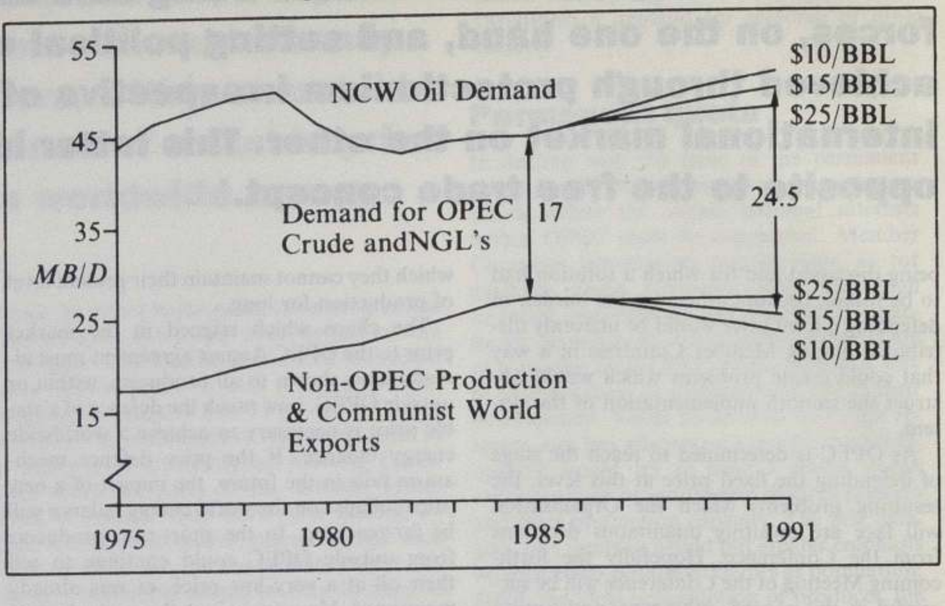
In a growing but volatile market financially strong companies may be well placed. However, producers may consolidate recent moves into the downstream and drive for market share to add value to crude production. This may be achieved by direct downstream initiatives or joint ventures with downstream companies.

Uncertainties

The response of both supply and demand would be as difficult to read as when prices increased. Demand growth would depend on taxation and tariff policies and substitution rates with alternative energy sources. Overall further rationalisation of the market and industry was likely to occur. ●

The graphics produced on this and the opposite page were provided by Mr Russell Seal

OPEC Production



Formula pricing is growing

Mr Joe Roeber, Joe Roeber Associates, discussed ***Changing Contractual Relationships and the Crude Oil Market Structure.***

Reconciling opposed needs

The change for the setting of price levels to price relationship — in which the price was made in relation to another price, and was the basis of negotiation — was on the face of it ambiguous.

However, formula pricing linked the price to some market reference and enabled the creation of a relationship which kept both sides happy. The net result was that prices moved autonomously. Available only in a limited extent now, it was growing.

Through formula pricing, some of the damage done to term contracts by unstable prices was mended. Other commodities had been forced into this system.

The shift to formula-pricing was logical, but highly unconventional for the oil industry.

It was, however, he argued, not an aberration but a practical, inescapable logical way of reconciling two opposed needs:

- Supply continuity, term relationships, planning
- Delivering at a fair price

Netbacks were only one — and a particularly tricky one — among many possible ways of deriving prices. Formula-pricing was the important change, although netbacks did introduce some new features. What was interesting was that netbacks had not swept the board. At peak they accounted for rather less than half of crude in international trade, and were now losing ground.

If prices were stable there would be no need for formula-pricing. He said that, as it was, formula-pricing defined OPEC policy: the embodiment of market autonomy: and no sovereignty. One thing was clear: OPEC's big problem was dealing with the swing on production. If prices were fixed (even if this varied monthly), this must allow production to be set by the market; but unless there was a readiness to absorb the consequences, it could not work.

Life was much easier, more rationally ordered, in the old days, but it carried a cost in terms of rigidity and maladaptiveness. He thought the market would stay where it was. People had learned the benefits of being able to respond to market opportunities as they arose. Once they lost their terror (or contempt) for spot trading, they had found it a useful tool. Once they got through the barrier of prejudice that prevented them from taking futures seriously, they had found it a valuable instrument. It was inconceivable that they would give them up. ●

Uncertainties

✱Supply
—Production restraints
—Fixed prices

✱Demand
—Taxation
—Tariff policies
—Substitution rates

✱Time lags

✱Exchange rates

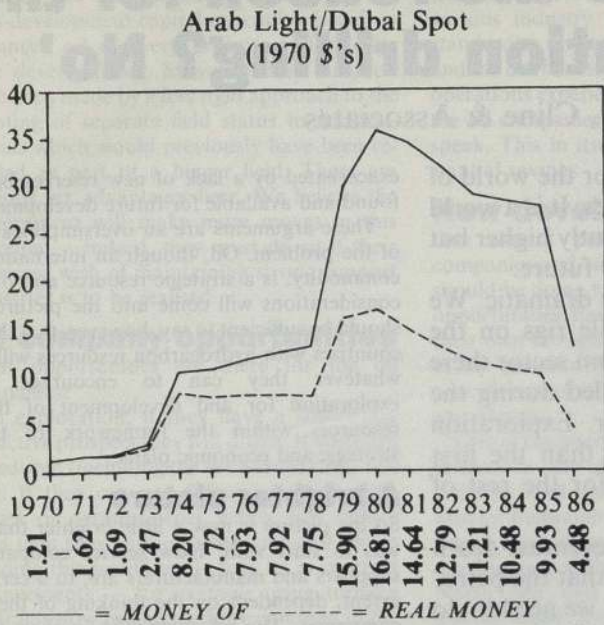
Outcome — Producer Links

- **Netback deals**
- **Deep equity margins**
- **Downstream initiatives**
- **Joint ventures with downstream companies**

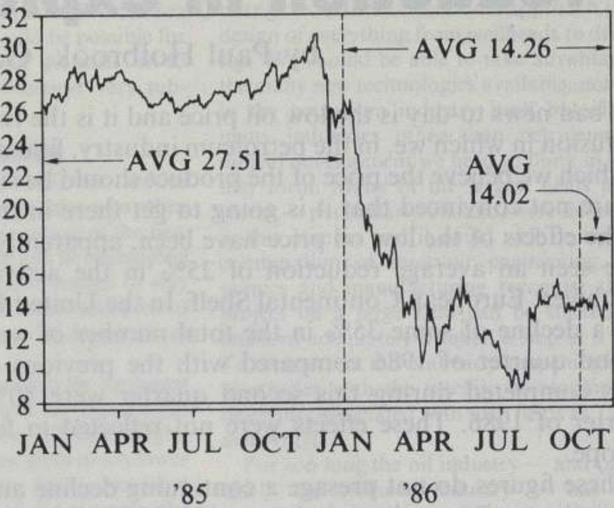
Industry Structural Response

- **Deintegration/Decentralisation**
- **Profit centres**
- **End to cross subsidisation**
- **Downstream rationalisation**
- **Producers moving downstream**

Crude Pricing Post 1970



Spot Brent Pricing



Agreement on confusion

Dr Paul H Frankel, CBE, President, Petroleum Economics Ltd, and Mr Robert Mabro, Director, Oxford Institute for Energy Studies, led an Open Forum discussion on *Conflicting Trends and Views*.

Mr Robert Mabro averred there was a total state of confusion in decision-making on the price question in consuming countries. Governments were worried about security of supply, although they liked low prices. If countries wanted a free market, they should say so. If they preferred a fixed price, they should say that.

If there was a fixed price, what should it be? A stable $18 a barrel for two or three years would create confidence and achieve investment. The problem was how to stay there by fixing the price without fixing the quantity. But there was a lack of political will and the result would be a good deal of instability and irregularity in price, and perhaps trouble in the Middle East.

Dr Frankel took the view that OECD and OPEC views were not so diametrically opposed on price as they had been. But this would not lead soon to stability as changes were slow.

Wide range of production cost

He was surprised that no one had talked about the problem in relation to the wide range in the cost of production. Was $1-barrel-oil in the same market as $15 oil?

If there was a free market and purely commercial negotiations at the centre, then the expensive oil would not be produced.

For political reasons, the West could not rely on an area of doubtful stability and one where US and USSR affairs of interest met. To continue to live in a world where high-cost oil was kept in production could only be possible by the administrative protection of high-cost producers.

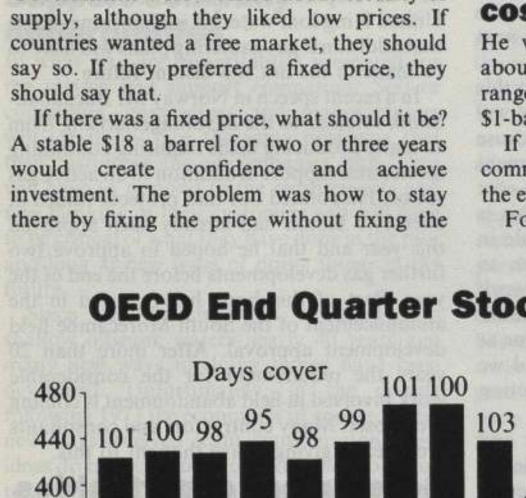
Unless OECD acquiesced in co-operation with OPEC to maintain price at a certain level, there would be not $15-barrel oil, but $8.

Mr Mabro, however, did not see a situation where OPEC and OECD would cooperate.

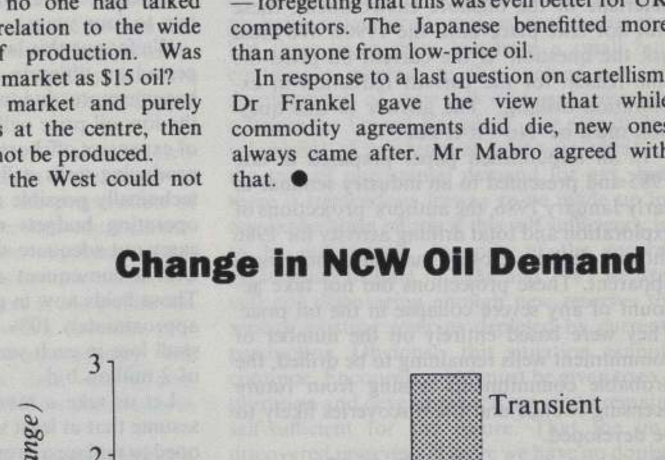
Dr Frankel observed that the UK needed money but at the same time liked low-cost oil — foregetting that this was even better for UK competitors. The Japanese benefitted more than anyone from low-price oil.

In response to a last question on cartellism, Dr Frankel gave the view that while commodity agreements did die, new ones always came after. Mr Mabro agreed with that. ●

OECD End Quarter Stocks



Change in NCW Oil Demand



'Is the current oil price the reason for the reduction in exploration drilling? No'

by Paul Holbrook, Gaffney, Cline & Associates

The bad news to-day is the low oil price and it is the reason for the world of confusion in which we, in the petroleum industry, find ourselves. It is a world in which we believe the price of the product should be significantly higher but we are not convinced that it is going to get there in the near future.

The effects of the low oil price have been, apparently, quite dramatic. We have seen an average reduction of 25% in the active mobile rigs on the Northwest European Continental Shelf. In the United Kingdom sector there was a decline of some 35% in the total number of wells drilled during the second quarter of 1986 compared with the previous quarter. Exploration wells completed during this second quarter were 40% less than the first quarter of 1986. These effects were not reflected in figures for the rest of Europe.

These figures do not presage a continuing decline and the eventual death of our domestic petroleum industry. Nor is it to be supposed that the petroleum related support industries will suffer the same fate. What we need to do is to look at the facts and discuss the real opportunities which exist in the present circumstances.

Drilling activity

Ignoring, for the moment, the current level of new field developments and offshore construction, let us first consider this question of drilling activity. The rate at which exploration wells are being completed is always a good guide to assess the future prospects and growth of the petroleum industry in any country or region. In each of the years 1984 and 1985 more exploration wells were drilled offshore the United Kingdom than in any previous year. Success ratios were as high as they had ever been. This augurs well for future offshore development and construction although, in view of the long lead times characteristic of the offshore environment, these will not take place until the 1990s. We must ask the question 'is the current oil price the sole reason for the current reduction in exploration drilling?' The answer to this question must be 'No—it is not'.

In an unpublished paper prepared in late 1985 and presented to an industry seminar in early January 1986, the authors' projections of exploration and total drilling activity for 1986 showed declines closely matching those now apparent. These projections did not take account of any severe collapse in the oil price. They were based entirely on the number of commitment wells remaining to be drilled, the probable commitments arising from future licensing rounds and the discoveries likely to be developed.

Government legislation

We have been through a long period when the problems of the industry were not price or even project success. The main problem was legislation as Governments 'turned the screw' to increase the take from the industry in the expectation of ever higher prices. But the oil industry being the mobile animal it is, was able to move rapidly from region to region or country to country to make the most profitable investments. We saw the adverse effects of this tightening of the screw in our domestic offshore industry between 1977 and 1982, but now we are in a situation where price is the matter of greatest concern. This will affect the industry worldwide except where exploration and, particularly, development costs can be kept at comparatively low levels.

Three views on oil price

There are three different views today of the future oil price:

The first is that it is at a low point and will be back to $20 per barrel by Christmas 1986.

The second view is that it will remain at this low point for anything from three to ten years.

The third view is that the price will cycle between $10 to as much as $22 over the next two to four years.

We favour this latter view since within this period an ultimate shortfall in supplies will become more obvious. This will occur because the low oil price will inhibit the development of expensive offshore oilfields. Some high-cost producing wells will be shut-in where this is technically possible and cuts will be made in operating budgets resulting in a failure to carry out adequate workover and repair work with a consequent reduction in production. Those fields now in production will decline at approximately 10% to 15% per year and we shall lose in each year an average production of 2 million b/d.

Let us take a more conservative view and assume that at least some new fields are developed to replace a proportion of the production such that the resulting decline is only 10% per year. Even under these circumstances OPEC will need by 1988 to increase production to a point exceeding the non-OPEC production and giving them control of the market once more. The crux of this argument is that sometime after 1988 the price of oil will rise once more. In addition to the loss of production the current low oil price leads to increased consumption and less concern regarding conservation. If exploration is drastically reduced the position will be exacerbated by a lack of new reserves being found and available for future development.

These arguments are an oversimplification of the problem. Oil, though an international commodity, is a strategic resource and other considerations will come into the picture. It should be sufficient to say, however, that those countries with hydrocarbon resources will do whatever they can to encourage the exploration for and development of these resources within the framework of their strategic and economic plans.

A brighter picture

So the picture is now a little brighter than it was to start with! Now service companies, suppliers and manufacturers are, to a certain extent, dependent on the thinking of the oil companies. The oil companies in their turn will either be encouraged or discouraged in their activities by Government actions.

Nevertheless we must live through this next period however long it lasts, and we must look at today's world and today's prices and see what opportunities already exist or will be offered in the future. It is not our purpose to detail the existing or short term opportunities as they apply to offshore construction or other developments. These are already fully described in a number of industry publications.

Certainly opportunities in the offshore market have not come to a full stop. Only recently the plans for the sale of gas from the Norwegian Troll field were announced and even more recently Phase I of the Tommeliten field development was announced. In our own United Kingdom waters it is almost inevitable that additional gas gathering plans will have to be made in the not too distant future.

In a recent speech in Norway Mr Buchanan-Smith referred to the advantages arising from so many producing fields requiring continuing service and support in addition to an active gas sector. He pointed out that projects valued at over £1.9 billion had already been approved this year and that he hoped to approve two further gas developments before the end of the year. Part of this hope has matured in the announcement of the South Morecambe field development approval. After more than 20 years the requirement for the considerable work involved in field abandonment is coming ever closer. Many contractors and consultants are already giving active thought to this.

Government opportunities

What opportunities are there for the Government?

Exploration must be encouraged if future development is to be carried out. It cannot be stressed too often that discoveries made to-day will not come on stream before the mid-1990s. Moves in this direction are already apparent in the Tenth Licensing Round recently announced. Apart from making blocks available for exploration no front end payments are required and there are no conditions preventing would-be operators applying for and obtaining blocks in mature areas. In this country the industry has been pressing for tax relief on post-development capital expenditure such as enhanced oil recovery projects and satellite type developments. Moves in this direction have been made by a less rigid approach to the granting of separate field status to accumulations which would previously have been regarded as part of a bigger field. There are obvious tax advantages here. We believe the Government will make more moves in this direction — indeed, they must do so if their expressed wish of maintaining strong support industries is to be realised.

Oil company opportunities

What opportunities are there for the oil companies?

In exploration, if they have a sufficiently attractive prospect they will drill it. If costs can be reduced (including the tax burden) they will drill. If they can use different drilling techniques or arrangements which will reduce costs then they will use them and drill. Ways of doing things differently may lie in contract arrangements — for example using turnkey contracts now becoming more common in the USA offshore. They may use new technologies which will reduce rig time or enable less expensive rigs to be used.

The same is true in the development stage. If the discovery is big enough it will be developed. If different ways can be found to produce the oil or gas with smaller capital or operating costs it will be developed. Some of the different ways of doing things will evolve within the companies themselves. Dead wood will be removed, multi-layer management will be dismantled and duplication of effort eradicated. Already we have seen some of these changes taking place. The watchword is, if you like, 'Don't do less of the same. Do more — differently!'

Support company opportunities

In what way are opportunities presented for the service and support companies? Service companies, contractors and manufacturers will inevitably face the same problems that their customers, the oil companies, face. They will have to respond to the requirements and new thinking of their customers and will have to be critical of what they have done in the past and look at new ways of doing things in the future.

Since the industry first ventured into shallow offshore waters nearly 40 years ago many new ways of doing things have been developed. Unfortunately, in the decade following 1973 the economics of some of these new ways received scant consideration. New ideas do not come to a full stop, they continue to evolve and come to the fore — but now the economics will be a very important — if not the most important — factor.

When we talk of lower costs and reducing costs it is not intended to imply that mark-ups or profits should be reduced. The lower costs must come from improved efficiency or better equipment that reduces rig time. It will probably take some time for the oil companies to change their traditionally conservative approach to innovative ideas and new technology but efforts must be made to work out with the companies methods by which ideas can be transformed into practical operating techniques. How often have we heard at various industry forums the great need to standardise on equipment, steel specifications and the like? Surely after 20 years of North Sea operations experience it should be possible for the oil companies to 'buy off the shelf' so to speak. This in itself would achieve very substantial savings.

New developments

One cannot presume to tell the service companies and support companies what they should be doing to take advantage of the new opportunities. Each of them will be developing their own thoughts on what is needed to stay in the business. But a few brief examples of new ideas and different ways of doing things are relevant.

One of the interesting trends is the increased interest in the development of lightweight drillpipe and casing. Use of lightweight, usually aluminium, drillpipe gives much lower torque and drag forces in highly deviated development wells typical of, for example, the North Sea and should make directional drilling easier and cheaper. Once aluminium has established a track-record in the North Sea, it will be possible to plan on accessing larger areas of reservoir from a platform and hence, potentially to save the cost of one complete platform in large fields — a very significant saving. Lightweight drillpipe also enables the drilling equipment to be somewhat smaller and lighter and hence to permit use of a lighter and cheaper substructure and platform. These same considerations have led to a number of research and development projects being proposed for lightweight casing, some involving composite materials.

Secondly there are the different ways of doing things. As consultants we fall into the service company and support category and we have had to devise ways of doing things differently. Some time ago we expanded our professional strengths beyond the confines of those required for the natural resource exploration, producing and marketing industry. We have been able to successfully generate new business with clients who are the end users of these natural resources.

In another field we have taken a new approach to certain studies. In earlier times we restricted our activities to the preparation of purely exclusive reports for individual clients. However, there are a number of subjects which receive our continuing attention which are based solely on information in the public domain — the volume of which becomes ever greater irrespective of industry activity. The costs of maintaining these data bases is very high but has to be incurred if we are to stay in business.

Preparation of exclusive reports using this data for a single client can be very expensive and, in current circumstances, probably not justified. But we know that we can produce reports of significant importance and interest to a number of companies thus enabling the costs to be spread between them. We have been successful in doing this and other reports are in preparation. These include a study of the United Kingdom gas supply and demand to the year AD 2000 and another which will look at the worldwide oil supply, demand and price to the same date.

The manufacturer too has the opportunity to do things differently. To do things which will substantially reduce costs. Under present circumstances the operators should welcome a change from the conventional approach to the design of everything from wellheads to drilling rigs. We should be able to take advantage of the many new technologies available, not only in the petroleum industry itself but also in many industries other than petroleum. In oilfield development we need to think in modular form. Many of the largest fields in the world — particularly on land, were developed in this manner and it could well be that the combination of reservoir engineering, economics and manufacturing recognise that a project on a large field can be started and financed adequately if taken a step at a time. To some extent this is already happening in the North Sea with the satellite development of reservoirs associated with such fields as Tartan and Argyll.

For too long the oil industry — and particularly the offshore industry — has been regarded as an entirely different and distinct industry. For many companies this idea has made them believe that they cannot participate in the petroleum industry. Conversely, many companies established in the petroleum related industries have felt that there was no place for them outside of the industry. Surely the disciplines and skills required in the petroleum industry are common to many others. There are several examples of companies breaking these fetters. There must be a case for companies to spread their risks over more than one industry and thereby gain an introduction to new markets both at home and abroad.

Exploration and development must be encouraged

To obtain a true overall picture of our offshore industry other things besides drilling activity and current oil price must be considered. It is probably not generally realised that during the last three years there has been a small but continuous increase in the average rate of development of new oil and gas reserves offshore the United Kingdom. The rate of development of gas reserves is almost equal to the rate of our annual demand for gas, but there is tremendous leeway to be made up in our exploration efforts if this self sufficiency is to be maintained. In spite of the record exploration drilling in 1984 and 1985 we are still not discovering enough new reserves to replace existing reserves depleted by current production. Obviously this situation cannot continue. Encouragement must be given to exploration and development if we are to remain self-sufficient for the future. That the undiscovered reserves are there we have no doubt — at least to serve us well into the next century.

There is great scope for the future — but the conditions have changed. Let us think of our industry as a new company formed to meet the new challenges and grasp the new opportunities. Petroleum (1986) plc is in the same high risk business as the old company. We expect the shareholders to be the same and while we cannot see a boom in the immediate future we are confident of a steady turn round and a profitable business in the long term. ●

KATHON FP 1·5

KATHON FP 1.5 is a highly effective microbicide developed to prevent the growth of microorganisms in liquid hydrocarbon fuels–such as diesel, kerosenes, home heating oils and aviation fuels.

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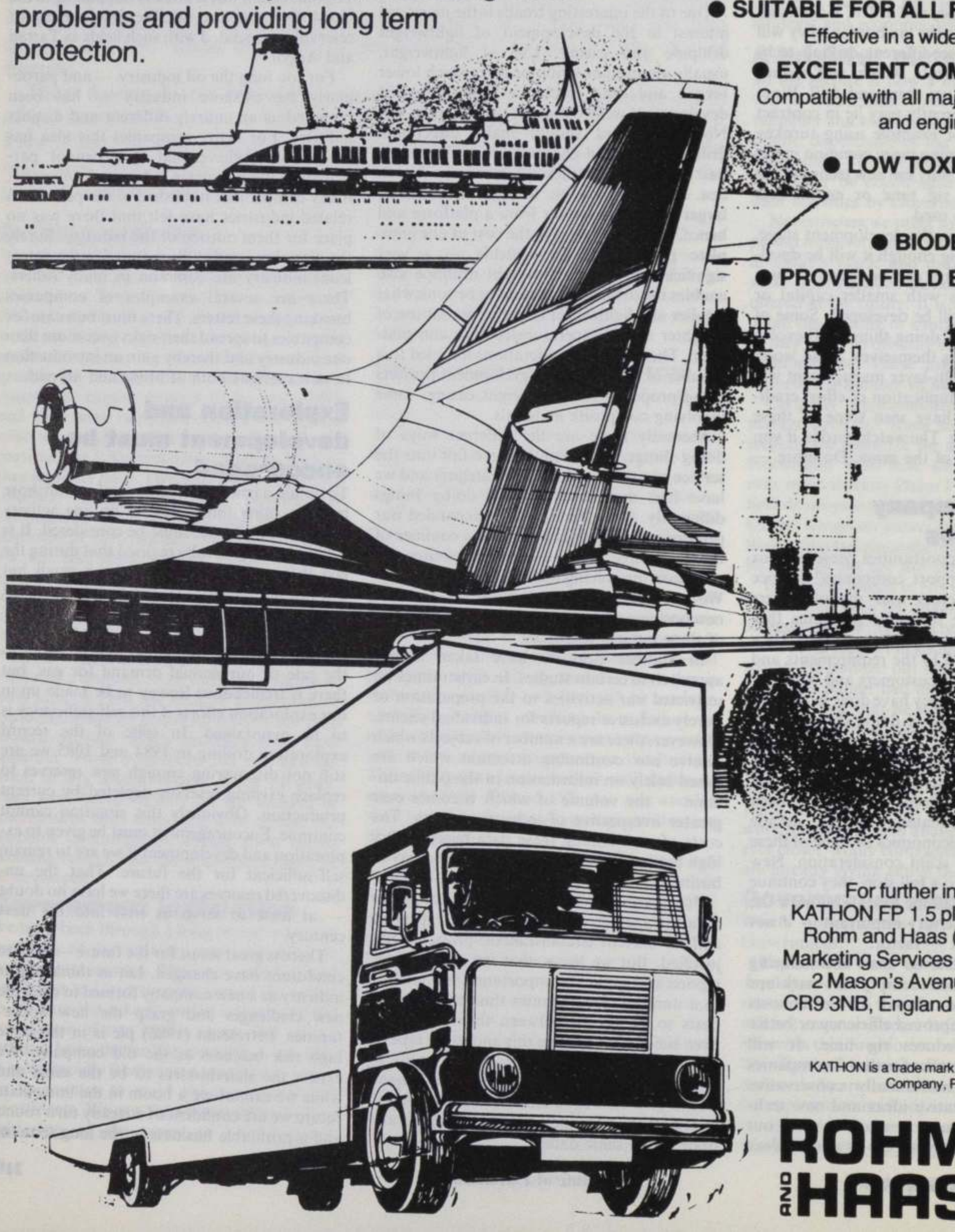

For further information on KATHON FP 1.5 please write to Rohm and Haas (UK) Limited, Marketing Services Department, 2 Mason's Avenue, Croydon, CR9 3NB, England or telephone 01 686 8844

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ROHM AND HAAS

IP Microbiology group task force on fuel contamination

RJ Watkinson reports on its first Meeting

● Recent reports of fuel contamination would seem to indicate an upsurge in the incidence of microbiological contamination, particularly diesels and gas oils, often in end user locations.
● The questions arise whether this impression is real, if so what the cause may be and what concentrations of micro-organisms constitute a potential problem since no fuel storage environment is microbiologically sterile?

A task force has been initiated by the IP Microbiology Executive Committee to consider these questions and report on the status of microbiological contamination of fuels.

The first meeting of the task force took the advantage of inviting many delegates attending the previous day's Conference on Microbiology of Fuels to it's first meeting. This took place at the IP on Wednesday, 30 October and was attended by 20 participants with experience of fuel contamination.

Topics

The group exchanged information and discussed the following topics:

Symptoms of fuel malfunction due to microbial activity.

Sampling regimes, methods and their significance.

Microbiological test methods.

Interpretation of data.

Remedial techniques and outcomes.

Contributing factors to microbiologically associated problems.

It was generally felt that, as a whole, the incidences of serious problems were relatively few. Certainly in the case of aviation fuels where good housekeeping has traditionally contained the onset of microbial contamination it has continued to do so.

It would seem, however, that incidents with diesel and fuel oils have made themselves felt with many examples of filter blocking and tank corrosion being reported. The use of fuels in marine locations, and transport by sea, would seem to be making the major contribution to the number of incidents, although there are several instances of land born examples.

The majority of problems were manifested close to the end user rather than in the production at refinery or the major distribution centres. Those problems attributed to microbial activity always seemed to involve an associated water phase.

Techniques for sampling fuel tanks posed a problem for many investigators since many of the tanks had limited access. It was desirable to have samples of water bottoms and the oil/water interface but samplers and techniques for locating the different phases would seem to need some further development.

Only a few of the delegates were expert in the application of test methods and an extended discussion was left for these experts to undertake at some later date. There were limitations to the application of dip slide techniques to investigations of the various fuel storage phases and direct and microscopic observations were thought to yield a lot of useful information.

Discussions on the interpretation and significance of microbiological data outlined the lack of a uniform approach. Each investigator had his own trigger points for levels of microbial contamination that indicated the onset of a problem.

It would seem some investigation of the levels of microbial contamination correlated with some performance characteristics may be required. Also the type of organism found in the system was important since the impact of yeast contamination could be different from a fungal problem.

Most participants had some experience of microbial problems that had been solved either by biocide treatment alone, treatment with bleach, completely draining tanks and physically scouring the tank. An important point was that if the quantity of biomass in the system was significantly large, even though killed by some physical or chemical treatment, it still posed a threat as particulate material.

Prevention of the problem was generally achieved by good housekeeping. This included daily removal of water bottoms, monitoring water bottoms and biocide treatment as necessary were frequent strategies that were effective in maintaining clear systems.

Educational video

The contributing factors to microbiological contamination of fuels had been the focus of the conference the previous day. It was felt that some of the changes within the refinery could be contributing to the overall problem in fuel oils but the greater contribution would seem to come from a lack of understanding and sometimes poor fuel management at the consumer end. Those parties that carried out the recommended procedures given by petroleum companies would seem not to suffer general problems.

It was decided that smaller groups will meet in the future to discuss specific areas and topics arising from the meeting.

It is also the intention of the Microbiology Executive Committee to produce an educational video on origins, detection and prevention of microbiological contamination of fuels. ●

Review **Diary**

Reviving Britain's other offshore industry

(From the

Oil companies are gaining new customers with the revival of inshore fishing from many British ports. This new breed of fishermen tend to be very young – in their late teens or early twenties. They have chosen this way of making a living partly because there is usually scant alternative in the areas where they live and partly because they are in love with fishing, for all its perils and uncertainties.

'You've got to be interested, you couldn't do it otherwise,' explained Stuart Gosman, an 18-year-old fisherman from Broadstairs, Kent. 'When you go out with nets you never know what you're going to get. You might pull a blank one day and then a net full of bass the next. Other times you pull in the nets and find them full of weed. It can take two days to clear and you wonder: what on earth am I doing this for?'

Stuart is one of eight young fishermen who have revived the Broadstairs fishing fleet virtually from scratch over the past seven or eight years. He obtained his own 26ft inshore fishing vessel for £7,000 with the aid of a bank loan. It is powered by a Ford 72-horsepower diesel engine.

'I'll use about a gallon of fuel an hour and we might be sailing for eight hours a day,' he estimated. 'Fishing vessels customarily use diesel. Petrol and seawater don't mix – you have to have electrics and they cause all sorts of problems.'

A very tenuous living

Since Iceland imposed extensive fishing limits, the number of deepsea vessels sailing from UK ports has seriously declined, leaving inshore vessels as the main growth area in the British fishing industry. Not that Stuart and his colleagues are likely to get rich overnight. 'It's a very tenuous living,' he admitted. 'On top of the bank repayments, you can look to spend £2,000 a year on nets. You have got to have a fair turnover but sea conditions mean we usually only fish one week in two.'

During spring tides (the time of highest high tides and unconnected with the season), fishermen are obliged to stay onshore because the torrent of water can roll boulders the size of tables into their nets. It is possible for nets to get snagged even in calm conditions and repairs are time-consuming.

Britain's extraordinarily changeable climate means that the weather can alter drastically in the 12 hours that the nets are left out. 'You think nothing of going out in a Force 7 or 8,' Stuart said.

'You've got over £1,000-worth of nets out there and you've got to go. My brother Malcolm who sails a 23-footer was caught out in a hurricane. It was over Force 12 – off the clock. The trouble with high storms is that you can't handle the nets, you just can't haul them in against the pressure of the wind.'

Insurance is out of the question. The premiums demanded would obliterate any profit in this knife-edge industry. Instead, the young fishermen of Broadstairs work co-operatively. They provide one another with crews – handling even a small inshore vessel is a two-man job – and keep a constant look-out for anyone in danger. 'It's not competitive here, all the fishermen help one another like a family,' Stuart said. I was assured that this was not always the case in the other ports.

Technology helps

To help even the odds in their constant struggle against the elements, the inshore fishermen of Broadstairs invest in the latest maritime technology. Stuart sang the praises of his Decca Navigator – it gives course to steer, speed over ground, estimated time of arrival, together with positions accurate to 20 feet. In particular, the device is a boon for finding nets even in thick fog. Stuart also uses hyraulic-powered net-haulers which spool net cables on big rubber drums. Net design is getting ever more efficient and the type used by Stuart was not available even three years ago.

'Nowadays even small boats are getting sophisticated and everyone has radio. Ten to 15 years ago, they were all open,' Stuart added. 'I shoot $1\frac{1}{2}$ miles of net. Each net is 50 yards long by 5 feet deep. There are eight 50-yard nets in a fleet and I have six fleets.'

Sid Wisker, the Broadstairs Harbourmaster and a major force in bringing about a revival of the town's fishing fleet, underlined that fishing from a smaller boat was a young man's game. 'If you're single and don't have a lot of money worries, it's OK. It would be hard buying a house or maintaining a mortgage but you're better off with a small fishing vessel than being on the dole.'

He praised the seriousness with which the new Broadstairs fleet approached the business of fishing. 'Before, we just had one or two blokes doing it part-time and they might have had a dozen lobster pots. These lads tackle it a lot more professionally. They have 60, 70, 100 pots each. They're mostly non-drinkers. They can't afford to do it, the money has to be kept flowing. If you haven't the money to replace your gear, you can't fish. It's as simple as that.'

The half-dozen or so fishing vessels that can usually be seen moored in Broadstairs' picturesque horseshoe harbour are but a small reminder of past maritime glory. At the turn of the century, some 40 steam trawlers sailed out

s."
. Hook, R.A.)

of the town to the profuse fishing fields of Iceland and the Dogger Bank. The steam trawlers had in turn replaced sail trawlers from the 1870s onwards. Though far more expensive, the steam-powered vessels had great advantages in that they were not bound by the wind and could sail in rough weather.

In more recent times, diesel replaced steam and economics dictated that fishing vessels should become larger. This led to the extinction of many smaller harbours which simply could not accommodate the bigger boats. In recent years, however, history has repeated itself. The imposition of exclusion zones in many prime fishing areas has resulted in a drastic reduction in the fleet of large British trawlers and, as we have seen, a new role has been found for small inshore vessels.

There are very big steps between sizes of fishing vessel. If Stuart and his brother are successful, in a few years' time they might jointly be able to move up to the next size of boat costing around £50,000. Beyond that are the few remaining very big deepsea trawlers sailing out of ports like Grimsby which cost up to £1 million, carry a crew of 20, and take on 10,000 gallons of fuel when they bunker.

Price of lobster went down

Even 'inshore' fishing can occasionally be a misnomer, as Stuart explained.

'It's rare that you go out and catch nothing at all, but big catches are equally rare nowadays'

'When you're fishing for cod, you can be just off the coast or anything from 10 to 15 miles out. We catch cod in the winter months. They go on until the April months when the water gets warm. Then we trawl "flatties" – plaice, dabs, skate, sole – and some eels.'

'You have to go out at night for flat fish,' Sid added. 'Soles bury themselves up to nine inches deep during the day. Day and night don't count to fishermen – they have to go out when the tides are in.'

The fishermen of Broadstairs are adamant that the price they receive for fish is not reflected in the price on the fishmonger's slab. They sell direct to local shops. 'Eels may sell for a fortune but we don't get a lot for them and the price of lobster went right down this summer,' Stuart said. 'The wholesale price of cod is a bit lazy because there is so much about. It sells for between £4.80 and £5.60 a stone but the shop price is £1.40 to £1.50 per pound filleted. When fish are plentiful, we don't get as much but the price never seems to go down in the shops.'

Serious risks other than financial

Fishing has risks which are other than financial. In terms of serious injuries, British fishermen rank alongside agricultural labourers and coalminers. I was told of a Broadstairs mariner who was fishing alone and suffered the misfortune of being caught up in his own winch. 'He went round and round. He was still going round when we found him – what little there was left of him.'

'Fishermen shoot at night, in thick fog, in gales. It can be a very, very dangerous business if you don't watch everything you do,' emphasised Sid Wisker. 'But they always return to fishing. It's like a drug and demands 100 per cent interest. A boat is a hard mistress. There is always something to do on it. You can never walk away and say there is nothing to do.'

Despite his youth, Stuart has already been fishing for four years. His first vessel was a 16ft dinghy called an Orkney long-liner. But, like most of his fellow fishermen at Broadstairs, he does not come from fishing stock. In fact, his father was an officer in the Metropolitan Police, who, after retirement, came down to live in Broadstairs on the recommendation of Sid Wisker.

And Mr Wisker, who looks every inch the old salt as he sits in the ancient wooden Broadstairs boathouse and recounts tales of wrecks on the nearby Goodwin Sands, was actually head of the art squad at Scotland Yard until 1973.

Stuart said that the gambling element was one of the reasons behind the strong appeal of fishing. 'It's rare that you go out and get nothing at all but big catches are equally rare nowadays. You can lose half your nets at one time if a coaster snags them. We mark them with flagged buoys to try and prevent this happening.'

'You grow up quickly — you have to if you are going to survive'

Was Stuart worried the first time he took out *Pot Luck*, his aptly named vessel? 'No, I was quite confident. In fact my hauling gear broke and my brother had to get in my first catch – it was quite a good haul of bass.'

For Sid Wisker, the return of fishing has brought some 'completely unforeseen' benefits. 'Because they work all hours, the harbour is protected and vandalism has been cut down to virtually nothing. And the fishing has become a tourist attraction in itself.'

Though Stuart is only 18, he has the broad frame and full beard of a man in his mid-twenties. Catching the surprise in my eye when Stuart told me his age, Sid pointed out to the rolling grey waves of the English Channel and remarked 'If you go there, you grow up very quickly. You have to if you're going to survive.'

Stuart regards his career at sea philosophically. 'I'm quite happy for this to continue – not for ever, but for a few years yet. As soon as you lose interest, that's it. You're frightened out of your wits one day, but you'll still go out the next.' ●

Christopher Hirst

'Hardly an industry in retreat'

● The fall in oil price has caused oil operators to reassess many planned developments. The Wescon '86 Conference, held recently in Glasgow, examined the challenges and opportunities presented to the offshore oil and gas industry following these radical changes

In his Opening Address to Wescon '86. Dr Pierre H Jungels, President of The Institute of Petroleum, said:

'Since the last Westcon conference, the world of the UK offshore oil industry has gone through the traumatic experience of the price collapse of 1986. I understand that the traumas are even harsher and harder in Scotland, though, of course, they can be felt down south. We can debate at length whether or not the oil industry over-reacted but it did react fast and sometimes brutally.

'Now that prices seem to have settled around $15 per barrel, we may start looking at the real challenge of UK offshore which is to find ways and means to bring into production smaller oil and gas accumulations without the advantage of continuously rising prices to help to hide our management mistakes and engineering overkill. It is true that a certain amount of fiscal flexibility or incentives could accelerate the decision to develop some of the discoveries of recent years. The UKOOA and Brindex are now engaged in discussions with the Department of Energy to find the most cost effective way to achieve that objective.

'However, much more needs to be done on the part of the oil industry and associated organisations. Engineering design firms and contractors have long recognised that in the heydays of the past, costly variations of design and excessive reliance on engineering by committees, have led to unnecessary delays, cost over-runs and dramatically over-dimensioned installations.

'Given the tax ring fence effect of putting excessive weight of front end investment on the profitability of North Sea projects, it is clear that if, by good management and new, lighter engineering projects we managed to reduce the cost of development by, say, just 30 per cent, we might make economically viable developments which now have a negative net present value. One good example of that would be the T block. The slimming down of operator's management structures might help in this process, if only by reducing excessive overhead charges on projects to partnerships.

'The Institute of Petroleum is very proud to be associated with the West of Scotland Conference 1986 and we hope that the very distinguished list of speakers of today will address themselves to some of the problems I have just outlined. How important the problem is, is brought to mind by the fact that we heard recently that up to 20,000 jobs could be lost in Scotland.

'How can The Institute help in this process? Outside its historical role of providing codes of practice and standards for the oil industry, The Institute might become a useful focus for "club" research and development for the offshore industry.

'Going after research funds in a disjointed manner, as we seem to be doing at the moment, we end up having operators, contractors and various organisations dispersing themselves and in a sense wasting their efforts by having possibly up to 20 different organisations researching the same thing. We might even end up by having organisations, universities and institutes redesigning separation processes, multiphase flow and perhaps, why not, the wheel.

'I would suggest that The Institute of Petroleum, with its reputation of unbiased technical judgement and its unique library and information systems could become the central clearing house for all these research projects making use of the INFOIL 2 database. We are taking the steps necessary to improve our own management and, as you know, we have recruited a technical director whose main function will be to improve the effectiveness of The Institute and, we hope, make it more capable of responding to this sort of challenge.

'So, I just want to end on a happy note. You know that discoveries are still being made in the North Sea, some substantial, and even at $15 for the next 4, 5, 6, 7 years or whatever you care to predict—it will be wrong anyway but we may try to predict—we have the objectives to bring these into development by slimmed down projects and organisations and management. So let's hope that this conference will help us see through all this process.'●

**INFOIL 2 is a joint UK/Norwegian on-line database of current offshore-related and petrochemical research and development projects. The database has information on over 1,700 R.&D. projects at the present time.*

Minister emphasises long-term future for oil

The Rt Hon Alick Buchanan-Smith, MP, Minister of State for Energy, told the conference not to write off the offshore oil industry. He said:

'The fashion is to knock the oil industry — witness the current spate of reports. But beware of the incorrect and irresponsible. This industry has a long-term future.

'Of course we face difficult times, particularly those businessmen supplying the goods and services the industry demands. But all is not doom and gloom; there will continue to be many opportunities open to tough, competitive companies. I will continue to do all I can to support and to encourage UK companies because I recognise the need to consolidate and to sustain our leading position in this industry worldwide.

'We have firmly resisted demands for cutbacks in UKCS production, which would have serious consequences for the offshore supplies industry and for jobs. Those within Britain who call for such cutbacks simply do not understand the nature of our offshore industry compared with some other parts of the world. Our offshore fields demand huge front end investment — we cannot simply turn our production on and off like a tap.

'In any case, cutbacks in UKCS production could not affect the world oil market significantly. UKCS output is only about 6% of world oil production.

'The Government has always recognised the importance of the right fiscal regime on the UKCS. We overhauled the system in 1983; as a result it is already responsive to fluctuations in oil prices and does not inhibit worthwhile new activity.

'Two weeks ago the Chancellor announced that repayment of APRT will be brought forward for companies in fields which had not reached payback by June 30 this year — this generates some £300 million cash flow and the move has been well received by operating companies.

'The short term picture is not as black as the doom and gloom merchants paint. So far this year 58 exploration wells have been started, only three less than in the same period last year. Appraisal wells number 33 as against 40 in 1985. Four significant discoveries have been announced.

'Oil production continues unaffected by the lower price, and each day some £6 million is being spent on supplying, maintaining and operating our producing fields.

'The annual output of gas from the UKCS is at an all time high and is expected to increase further over the next few years. Some 25% of our current gas supplies come from Norway. As we move into the 1990s this source will need to be replaced, providing incentives for companies to explore for further indigenous supplies in our seas.

'This year I have approved 12 new developments worth some £2.1 billion. The major ones have been Conoco's £650 million 'V' field, and BP's £760 million 'Villages' field which have already produced a number of significant orders for contractors and suppliers.

'This is hardly the story of an industry in retreat.

'Looking ahead, the deadline for Tenth Round licence applications is fast approaching. The prime objectives of the Round are to maintain the momentum of exploration activity on the UKCS and to provide the potential for developments in the 1990s to replace existing fields as they start to decline.'

'I announced this Round in response to the demand from the oil companies. I share their confidence in the future.'●

(continued p.27)

'Research — North Sea lifeline'

Mr JH Choufoer, a Group Managing Director of the Royal Dutch/Shell Group of Companies, in the Keynote Address to WESCON '86 discussed the importance of R & D to the future of the offshore oil industry. He said:

'The message I want to bring out, is the importance to all of us of maintaining the impetus of research and development — a resource that is vital to all parts of the industry, and has been fundamental to the offshore industry's triumphs over the past 20 years in the North Sea.

'Firstly, the costs of R & D are often modest in comparison to those associated with full project development; but they can make major contributions both to the cost-effectiveness that is crucial offshore and to the industry's other activities.

'Secondly, research programmes are investments for the long term, the 'seed corn' for the industry's future; and it is bad policy to allow short-term factors, however serious, to dictate long-term strategies.

'Rather than being criticised for postponing or cancelling development projects, I believe that the industry should receive credit for projects that are going ahead in the North Sea despite prevailing price-levels. These positive decisions are based on two factors. The first is a belief that oil and gas prices will sooner or later rise again; the second is that North Sea operators have been able to cut project costs by substantial amounts.

'Today, speed is no longer the over-riding consideration: cost-effectiveness is the name of the game.

'I believe that industry should maintain the momentum on projects already underway by looking for every possible means of holding down costs and taking advantage of innovative technology.

'Before the collapse in oil prices there were few oil and gas fields anywhere on earth, onshore or offshore, that didn't deserve some attention on the assumption that oil prices would steadily increase in real terms and as a result more and more costly projects would continue to become viable. Technology was not seen as a limiting factor.

'Oil's qualities as an energy source, taking into account population growth, demographic trends and other factors, will see demand for liquid fuels likely to be as high in fifty years time as it is today. In the future even the smaller, remote offshore fields are likely to become economic, and their contribution will be needed to meet world demand for oil products.

'What concerns me today is that the science and technology essential to the development of these fields will not be available if oil company research programmes are cut back too far as part of overall cost-saving strategies.

'I am *not* saying that the research function should expect to be immune to general pressures to improve efficiency and reduce unnecessary costs. What I *am* saying is that promising research programmes should be the last candidates for cutbacks.

Responsibilities must be recognised

'The larger oil companies must recognise their responsibilities to the industry as a whole to try to maintain research programmes across the whole range of oil industry activities. In the Shell organisation, research in the upstream sector covers improving the efficiency of finding oil and gas, enhancing their recovery from both known and new fields, and producing hydrocarbons from unconventional sources such as shale and tar sands.

'Nor should one forget the benefits to the offshore to be indirectly gained from research in other areas of the oil industry. Let me explain. Oil companies have traditionally derived much of their revenues from the upstream, while the downstream in many markets has operated at a loss. Today, that situation has changed, at least to an extent. Research into such areas as refinery efficiency, residue upgrading, distribution techniques and new high-quality products is vital to maintain downstream margins. One prime example from my own experience in this direction is the catalyst work that has led to the HYCON process, which allows a wider range of crudes to be processed for conversion of residues into distillates while meeting ever more severe product specifications and environmental legislation. Looking further ahead, I would also mention the work on the conversion of natural gas to distillates.

'Identifying targets for research is only part of the solution. A very significant, but often underestimated, factor is to provide a stimulating environment that will give the greatest possible chance of generating effective results from research programmes.

Gaining a competitive edge

'It should not be forgotten that the fundamental purpose of research and development by a commercial organisation is to gain a competitive advantage. Industrial companies do not pursue science for its own sake. To maintain a healthy R & D operation it is necessary to bring in new science created in the outside world. This new science may be relevant to existing businesses, or it may lead the company in a new direction where the fit with existing businesses is not at all obvious. Although the customer of this work is the R & D organisation itself, the synthesis of this new knowledge with commercial appreciation is part of the creative activity that leads to industrial discovery. This is an essential aspect of industrial R & D, and I believe it is best carried out by industry.

'Each Shell operating company allocates its research expenditure according to its own particular needs. Shell Expro, for example, has a current research budget of £33 million on behalf of the Shell/Esso joint venture, and Shell UK is spending an additional £8 million on its own. This cash goes into three main areas: British industry; Shell laboratories; and universities and other British research establishments. This combination has two important results.

'The first is that local development projects have the immense benefit of access to international research. As I have already stressed, oil is an international business; without the technology developed earlier in other parts of the world, exploitation of the North Sea would not have been possible. Similarly, technology developed specifically for the North Sea will play a vital part in future ventures in new areas. One example I might mention is the underwater manifold centre installed in the Central Cormorant field in 1982. This was an evolution from an earlier submerged production system developed and tested by Exxon in the Gulf of Mexico, combined with subsea experience gained by Shell companies there, in Brunei and in Spain. Although this is only four years old, an equivalent facility could today be built at a substantial saving, allowing this system to have a tremendous influence on future production from deeper waters in the North Sea and elsewhere.

'The second benefit arising from the spread of research spending has been to enable local industry to supply not only domestic requirements, but also to compete on international markets. Any company that can develop technology to withstand the physical conditions while fulfilling commercial criteria in the North Sea — the biggest and most demanding test bed there is — must be well placed to handle projects anywhere in the world.

'Shell companies, not just in the UK, certainly regard the universities as being valuable sources of scientific progress, and intend to maintain the close links that already exist. Nevertheless, it must be remembered that industry expects a return from the monies that it places with universities, and as in any other area of expenditure must retain the prerogative to invest its funds where it feels they will generate the best returns.

'Today universities almost everywhere are keen to attract funds, and some are pooling their resources in order to offer more direct services to attract additional funds from industry. This is commendable, provided universities guide against any erosion of their primary role of producing the first-rate scientists and engineers that industry must have if it is to continue to respond to the challenges that it will face.

'The quality of those involved in the development of new science and technology is particularly important. No matter how well thought-through the programmes, how stimulating the environment, and even how generous the budget, the products of research will only be as good as the abilities of the people involved.

'I am convinced that the oil industry has the human skills that are needed, and the achievements over the last twenty years in the North Sea show that determination and enterprise are also here in abundance. Without underestimating the current problems, I am sure these same qualities will help the local oil services sector to respond in new, innovative ways to the challenge of lower oil prices and to seize the greater opportunities that will certainly follow.' ●

(continued on p.28)

'An offshore technology strategy'

Mr John d'Ancona, Director General, Offshore Supplies Office, discussed the role of the Offshore Energy Technology Board in the mobilisation of science and technology. He said:

'Recognising the increasing importance of R & D, the OETB was reconstituted last year with Alick Buchanan-Smith in the Chair. The Board's task is to create a UK strategy for the development of offshore technology for application on the UKCS and worldwide between now and the end of the century.

'The Board has concluded that the United Kingdom should pay particular attention to developing new technology in the following main areas: subsea systems and equipment for subsea production; weight reduction with cost reduction as the overall aim through the development of design techniques and process equipment and the use of new lighter materials; exploration with emphasis on locating and evaluating oil bearing strata with great precision; and drilling and production technology with emphasis on specialist areas such as measurement while drilling, horizontal drilling and new techniques of production logging leading to improvements in cost effectiveness and economic increases in the percentage recovery of reserves. Especially concerned with areas where new technology rather than heavy front-end investment will gain entry to the world's markets.

'There was widespread support from within the oil and gas industry.

'The Board then invited operators and supply companies alike to identify and to set in hand specific projects which will advance technology in these areas. The Board has made it clear that, when requested, it will act as marriage broker to bring together operators and suppliers working in closely related areas to reduce the cost and increase the likelihood of the success of projects.

'Having considered its strategy and identified the areas of best technical/commercial opportunity for the UK, OETB has now made significant progress in putting in place the machinery to devise national programmes in the four areas which encourage oil company/contractor/Government collaborative R & D projects to advance the programmes.

'However, whilst the development of new technology is seen as the crucial aspect in the OETB initiatives, we cannot and indeed do not overlook the important role that transfer of technology can play in future UKCS development.

'Sources of technology for the UK offshore supplies industry include the academic sector, other branches of engineering, the offshore industries of foreign countries, and the major oil and gas operators who constitute the main customers of the supplies industry.

'Transfer can arise in many ways including migration of staff between companies, licensing arrangements, partnerships and mergers between companies, new company start-ups and direct entruy to the sector by contractors well established elsewhere.

'Incentive for technology transfer is influenced by the market situation which as we all know does not appear too promising at present. However, the offshore gas sector is still relatively buoyant and there are still opportunities in the oil side. The main problem is of course finance. Short term pressures to reduce cash flow can, if carried to extreme, destroy the technical capability to respond when the inevitable upturn occurs. It is hoped that the more perceptive oil companies, in recognising this problem, will try to maintain sufficient flow of work to keep the best design teams in business.

'Parties to any transfer must perceive benefit to be derived from the exchange. The receiver of advanced technology should gain a greater profit potential derived from a keener competitive edge. The donor will expect access to a wider market.

'More often the oil companies have relied on their suppliers to propose and develop new ideas. This can lead to healthy competition with a range of equipment available to meet the customers' requirements. This scene is reasonably satisfactory in boom times when the supplies industry is generating sufficient cash flow to finance several similar projects. But, even in good times, competing attempts to satisfy an oil company requirement which may be imperfectly understood represents an inefficient use of resources. This we cannot afford. We look to the oil industry to help us to optimise the use of scarce resources at this difficult time.

'In more financially constrained times, such as the present, a closer co-operation between customers and suppliers where both contribute to defining the specifications and to funding the developments should lead to better and quicker solutions to the problems.

'It is essential that we pool resources if we are to benefit from the continuing, if reduced, opportunities on the UKCS and worldwide, and, more importantly, gear ourselves up now with the latest cost-reducing techniques to prepare ourselves to benefit from increased opportunities as markets recover.' ●

'Action must be taken by oil companies and government'

Mr David Walker, Britoil Chief Executive talked of the need for action by companies and the Government during a difficult period for the British oil industry. He said:

'We must not confuse the present difficulties with the future prospects. The present difficulties are very real for the oil companies and those who support us; the important point is to ensure we position ourselves for future opportunities.

'The oil industry must rearrange its programmes and portfolio and recognise that the most immediately attractive opportunities in areas like the UKCS are projects such as satellite developments. Oil companies and supporting industries must also be looking for additional attractive overseas opportunities. At Britoil, we have looked very closely at our exploration and development priorities; we have cut our exploration expenditure for the near term future; and we have taken painful but unfortunately necessary steps to reduce our staff numbers and overheads.'

As to actions over short term incentives by the Government, Mr Walker said, 'The recent announcement by the Government on Advance Petroleum Revenue Tax (APRT) is appreciated but the problem is larger than that and it can be alleviated by a reduction in the tax burden, particularly if cash can be released for re-investment.'

Mr Walker identified two areas where tax modifications should be considered.

'A credit from PRT liabilities on existing fields for near term development projects would make cash available. Developments which are likely to spend some time on the shelf would become attractive and lead to earlier future benefits and maintain activities for the oil companies and the support industry.

'A second point I must make relates to the question of the ring fence for Corporation Tax. I believe that to sustain the oil companies and the support industry the Government should consider allowing UK companies to offset overseas exploration expenditure against Corporation Tax. Most other countries allow our competitors this benefit.

'I have no doubt that an industry that has achieved so much in conquering the technical problems of the North Sea over the last twenty years can successfully address the current short term economic situation with commercial and technical solutions to enable us to flourish in the future.' ●

'Mobil bullish on North Sea prospects'

Carl J Burnett Jr, President and General Manager, Mobil North Sea Limited, discussed contracting and purchasing procedures of the company. He said

'We are looking at developing a number of satellite fields around the Beryl areas. These fields will use the facilities and transportation systems of the existing platforms.'

'We expect to run the Beryl platforms at least until the year 2017 when the licence expires and beyond that date if the government of that day is amenable to extension.

'Personally, I believe the petroleum industry in the U.K. North Sea will celebrate at least one centenary. The history of the oil business demonstrates that as provinces mature, and providing governments make it economic, more and more effort is devoted to finding and extracting the last barrel of oil or cubic foot of gas. The UK is no different and we are still far from the midpoint of the maturity curve for the UK oil industry.' ●

The economics of onshore oil exploitation

by Professor Alexander G Kemp and David Rose, University of Aberdeen

Introduction

In recent years there has been a considerable increase in interest in onshore petroleum exploitation in the UK. This interest appears to have been maintained after the dramatic oil price falls in 1986. The dramatic changes have necessitated a fresh examination of the basic economics of exploration and field development. This forms the subject of the present paper.

Investment decisions have to be made at several stages in the upstream part of the oil business. The two most important are those concerning exploration and development. When a field has been discovered the key factors determining the development decision are (a) the expected size of recoverable reserves and the associated production profile, (b) the expected oil price over a period which could be around 25 years, (c) the likely development of operating costs and (d) the fiscal regime. It is the interaction of these four factors which determines whether new fields will be developed or not. When exploration decisions are being made the main additional factors which need to be considered are the geological prospectivity and the exploration costs.

When these decisions are being made uncertainties surround the values of the key parameters. Account can be taken of these uncertainties in various ways. A simple but illuminating technique is sensitivity analysis and this has been employed in the present study. The effect of the fiscal regime is subjected to detailed examination. The fiscal system includes royalty (at 12½ per cent since 1982), Petroleum Revenue Tax (PRT) and corporation tax. The PRT terms include an oil allowance of 5 million tonnes. Relief for exploration costs was formerly allowed against any PRT income (including offshore), but now it is restricted to the income from the field to which the exploration relates. Abortive exploration expenditure is thus unrelieved.

Model fields

The analysis has been conducted with the aid of a set of hypothetical fields. These are designed to cover the range of field sizes and cost conditions likely to be encountered. In **Table 1** details are provided of the recoverable reserves, peak production, development and operating costs. The costs indicated are the best estimates available for the various field sizes. In the study variations on these values to the extent of ±20 per cent are also employed to represent 'high' and 'low' cost situations.

The LLV field is a single well development with minimal facilities. The LV and MV ones are 7 well and 14 well developments, again with minimal facilities. The HV field has 90 wells with a gathering station and water injection. The VHV field is a 116 well development, again with a gathering station and water injection. The HV field actually has the highest unit development costs followed by the LLV one.

Table 1: Reserves, peak production, development and operating costs of model fields

Field	*Recoverable Reserves MMB*	*Peak Production BPD*	*Capital Facilities*	*Drilling costs $ million 1986*	*Peak Opex*
LLV	0.4	60	1.4	0.45	0.14
LV	2.6	420	2.4	3.4	0.6
MV	4.12	840	4.2	6.6	1.3
HV	16.8	3850	37.4	55.6	5.6
VHV	44.0	6500	39.1	72.2	8.8

Financial modelling

The analysis has been conducted with the aid of a computerised financial model incorporating all the fiscal terms. Pre-tax and post-tax returns are initially calculated in money-of-the-day (MOD) terms as taxes are paid on this basis. Assumptions have had to be made about future oil prices, and inflation rates. The general inflation rate assumed is 4 per cent which also applies to exploitation costs. Because of the great uncertainty regarding the future oil prices three scenarios have been employed. Details are shown in **Table 2**.

Pre-tax and post-tax returns can be exhibited in several ways and investors typically employ a number of yardsticks including payback period, P/I ratio, discounted rate of return and net present value (NPV). The NPV is generally employed here with a 10 per cent real rate of discount. Tax takes are discussed in MOD terms and in real, present value terms again at a 10 per cent discount rate. The latter calculation is more relevant both to investors and Governments. The timing of payments as well as their level has a major influence on incentives.

Results of analysis

(a) Pre-Tax Returns

The pre-tax discounted returns under the three oil price scenarios are shown in **Charts 1–5**. Net present values at 10 per cent are positive under all price scenarios on the VHV, MV and LV fields. The HV and LLV fields exhibit some negative outcomes. The LLV field is clearly very marginal. The HV one is a high cost development because of the large number of wells required in relation to the size of reserves.

(b) Tax Takes in MOD Terms (Project Basis)

The tax takes on the 5 fields in MOD terms on a project, stand alone basis are shown in **Charts 6–10**. On the more profitable projects the take can exceed 70 per cent (on the VHV field), with a range of 50–60 per cent being more common. On the less profitable fields (HV and LLV) takes can exceed the top of this range.

It is clear from the charts that the fiscal system is distinctly regressive with respect both to oil price changes and cost variations. On all fields the tax takes are highest under the lowest oil price scenario. Similarly under any one price scenario the take always increases as costs rise. Not being based on profits the flat-rate royalty is a regressive element in the fiscal system and this plays a significant role in producing these results. The PRT on onshore fields is very much less important than it is offshore. Under the Medium Price the capital allowances, oil allowance and safeguard exclude all but the VHV field from liability. On this field PRT constitutes only 10.7 per cent of the total tax bill under the 'best' cost estimate. On most fields then the effective tax liability is essentially royalty plus corporation tax.

The absolute level of take on the onshore fields is still higher than on the smaller offshore fields exploited under the post-1983 budget terms where royalty is abolished and the PRT oil allowance double that applicable to onshore fields. On the less profitable HV and LLV fields the level of take becomes very high principally due to the royalty which impacts harshly when projects are very marginal.

(c) Tax Takes in Real, Present Value Terms (Project Basis)

Examining the operation of the fiscal systems

Table 2: Oil Price Scenarios Employed in Analysis ($ MOD)

Scenario	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*
Low Price	15	10	13	15	16	(4 per cent growth rate thereafter)			
Medium Price	15	18	(4 per cent growth rate thereafter)						
High Price	15	18	20	22	25	28	31	34	37 (4 per cent growth rate thereafter)

Chart 1

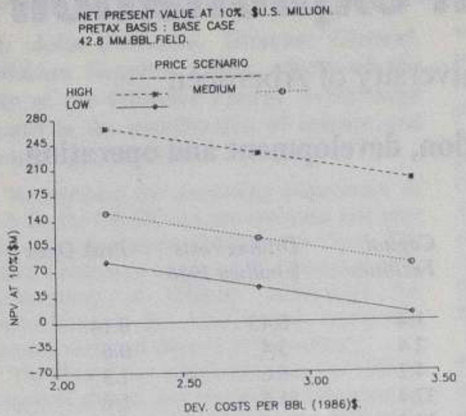
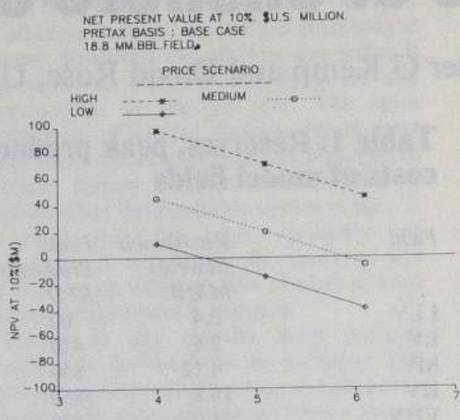


Chart 2



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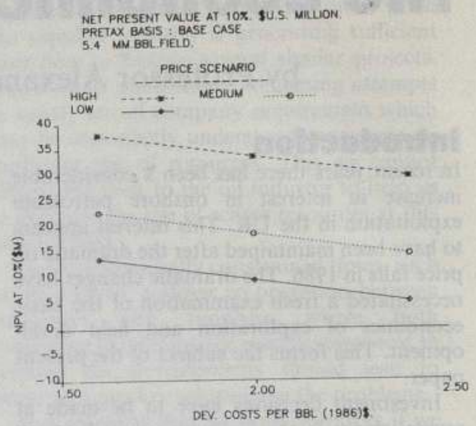


Chart 4

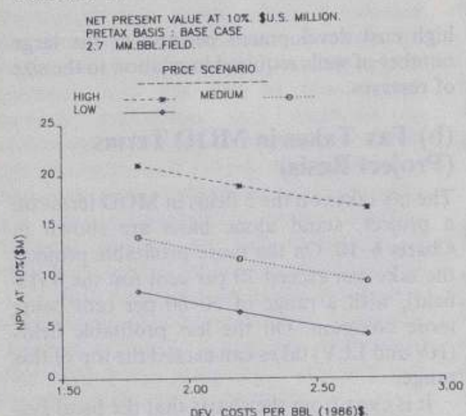


Chart 5

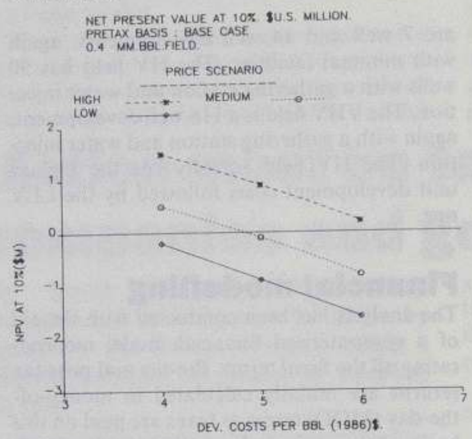
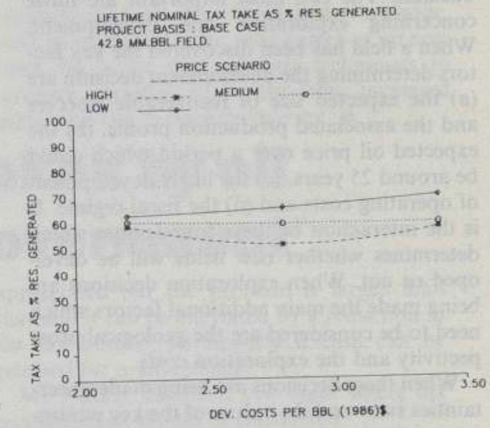


Chart 6



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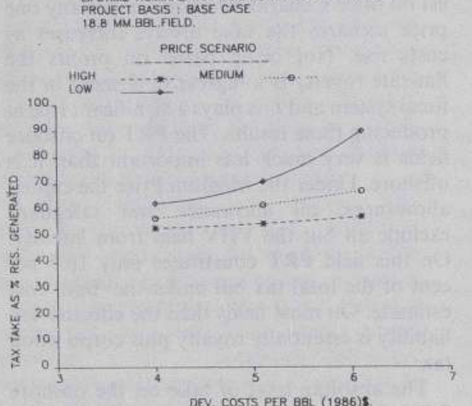


Chart 8

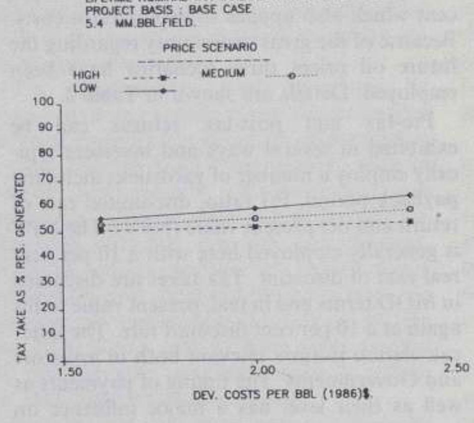


Chart 9

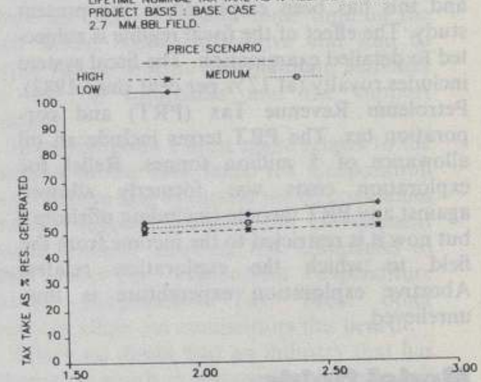
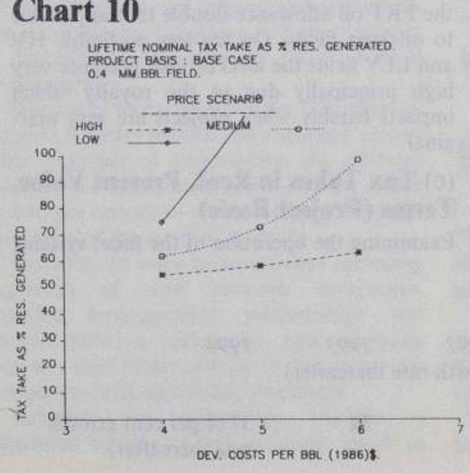


Chart 10



in MOD terms does not fully highlight their impact on investment decision-making. This is better achieved by analysing the takes in real, present value terms. This is how new projects are assessed by investors and emphasises the timing of payments as well as their level. A 10 per cent real rate of discount has been employed. The present value of the tax bill is calculated as a proportion of the pre-tax NPV. The pre-tax NPV at the investor's discount rate is a measure of the expected economic rent at the development phase.

The results are shown in **Charts 11–15**. The takes are seen to be higher than they are in MOD terms and structure distinctly more regressive. Under the Low Price scenario the takes become extremely high and sometimes extract more than 100 per cent of the economic rents leaving the investor with a return below 10 per cent. The royalty is payable as soon as production commences and it plays a significant role in producing this result. Since the changes to the allowances for plant and machinery in the 1984 budget the present value of the corporation tax bill has increased. On the Medium and High Price scenarios the takes remain at moderate levels on the 3 more profitable fields.

(d) Post-Tax Returns

Post-tax NPVs are shown in **Charts 16–20**. On the VHV, MV and LV fields returns are acceptable to investors on both the Medium and High Price scenario. The viability of the HV and LLV fields is in great doubt. Only under optimistic assumptions would the

Chart 11

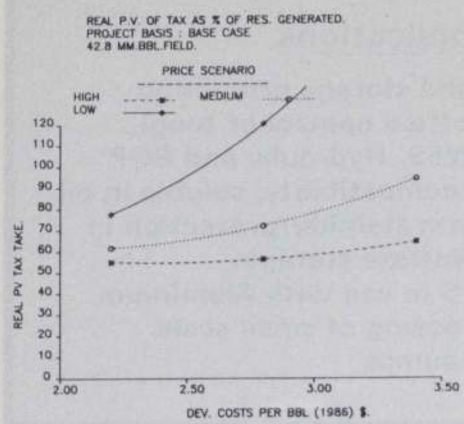


Chart 12

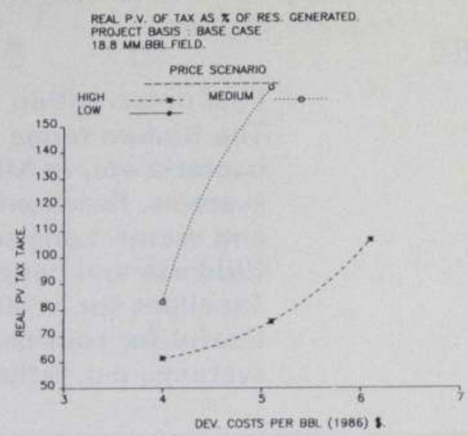


Chart 13

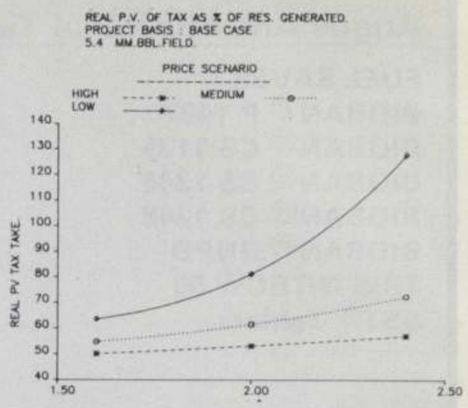


Chart 14

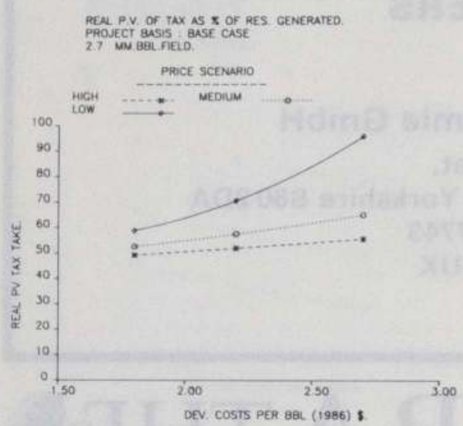


Chart 15

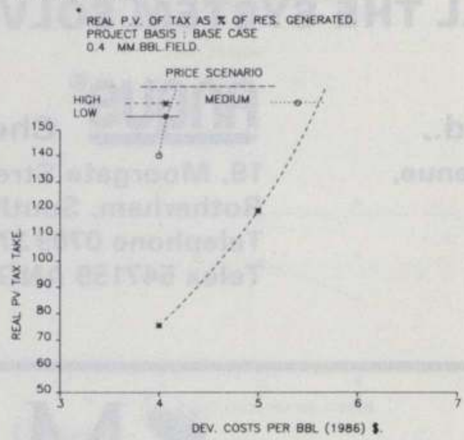


Chart 16

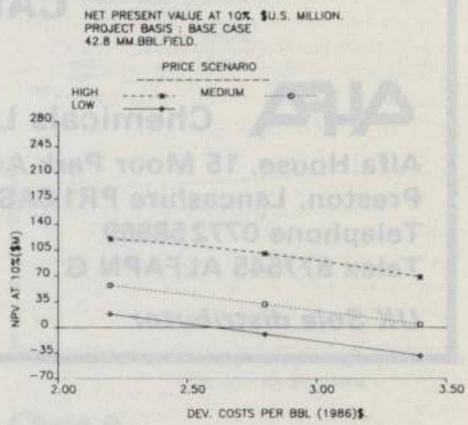


Chart 17

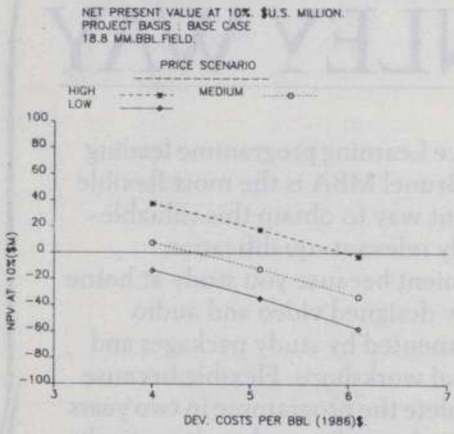


Chart 18

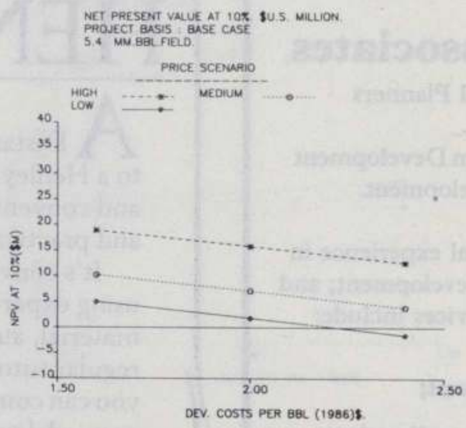


Chart 19

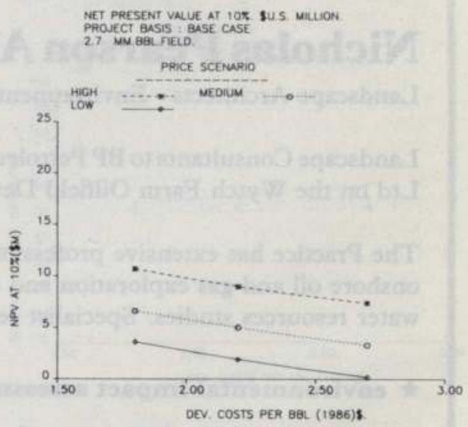
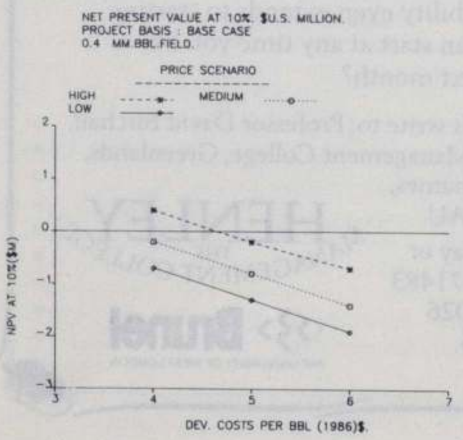


Chart 20



investor find the returns acceptable. A comparison with the pre-tax returns indicates that the fiscal system turns some acceptable projects (HV and LLV) into non-viable ones.

(e) Tax Takes in Real, Present Value Terms (Ongoing Basis)

Many investors in onshore petroleum exploitation will be making new field development decisions as part of their ongoing activities. This has implications for their tax position and for the effective cost of bringing a new project on stream. For corporation tax purposes allowances relating to development costs can be set against other income that the investor might have (including revenues from offshore activities). This in effect reduces the effective cost of developing the field to the investor by postponing tax payments. In the case of the onshore fields under review the effect is not strong, however: the present value of tax takes is reduced by only very modest amounts.

This result follows because the length of time between first development expenditure and initial production is comparatively short on onshore fields. Periods of 1–2 years are typical. Thus the value of these 'early' reliefs is comparatively small compared to offshore situations which are characterised by very long lead times between first development outlays and the commencement of production.

(f) Post-Tax Returns (Ongoing Basis)

It follows from the above that post-tax returns

Table 3: Pre-Tax and Post-Tax Risk Adjusted Returns on Onshore Fields under Medium Oil Price Scenario and 'Best' Cost Estimate. (Chance of Discovery 1 in 5)

	Pre-Tax Returns		*Post-Tax Returns (Ongoing Investor)* *Immediate Relief for PRT*		*New Rules for PRT Relief*	
Field	*IRR (per cent)*	*NPV at 10 per cent (\$ million)*	*IRR (per cent)*	*NPV at 10 per cent (\$ million)*	*IRR (per cent)*	*NPV at 10 per cent (\$ million)*
VHV	24.8	107.8	16.3	31.6	15.5	28.8
HV	13.0	13.3	6.1	−12.8	5.5	−15.6
MV	19.3	12.2	20.1	6.3	14.2	3.4
LV	17.0	5.3	23.9	4.0	12.5	1.2
LLV	−ve	−6.5	−ve	−1.7	−ve	−4.5

to ongoing investors are improved over those obtaining on a project basis by only very modest amounts. Net present values and internal rates of return are increased on all fields. On the Medium oil price scenario under the 'best' cost estimates the rate of return on the MV field increases from 22.8 per cent to 23.3 per cent. On the HV field it is increased from 6.1 per cent to 6.3 per cent.

(g) Project Completion Delay

In onshore petroleum exploitation projects are sometimes bedevilled by delays in their completion. This is frequently due to issues connected with environmental protection and the associated requirements for planning permission for exploitation activities. The effect depends upon (a) when the delay takes place, and (b) the length of the delay. If the delay takes place after a considerable expenditure has taken place the negative effect on the return from the project will obviously be greater than it would be if the delay came before the main investments were incurred.

To test the importance of this phenomenon a delay of one year was imposed on all activities one year after the first tranche of capital investment had taken place. The effect on post-tax returns depends not only on the delay to the commencement of production but on the behaviour of oil prices over time. If the price was on a sharply rising trend out of a trough the resulting increase in the value of revenues could compensate for the project completion delays.

Under the Low Price scenario this effect is so strong that it more than compensates the investor for the negative effects of project completion delay. Post-tax returns are thus fortuitously higher as a consequence of project completion delay! Under the other price scenarios, however, post-tax returns are reduced. On the VHV field under the Medium Price scenario the rate of return is reduced from 16.3 per cent to 15.5 per cent and on the LV one the fall is from 33 per cent to 26.6 per cent.

(h) Full Cycle Post-Tax Returns

The position of the investor after incorporating exploration costs into the analysis is now examined. The main exploration costs included in the analysis are for seismic and drilling activities. In this study the cost of a typical exploration effort with one well being drilled was taken as \$1.14 million at 1986 prices. The rules for relief of exploration costs for PRT purposes set out in the Finance Act, 1983, permitted 100 per cent first year write-off against any PRT income (including offshore). Subsequently these rules have been changed and from 1st April, 1986, immediate relief for exploration is no longer available against other PRT income. Instead the allowances have to be carried forward and set off against the income from the field to which the exploration relates. For successful exploration an uplift of 35 per cent is available.

Post-tax returns are obviously reduced by the inclusion of exploration costs. For an ongoing investor who has been able to claim immediate relief for *both* PRT and corporation tax the inclusion of the exploration effort reduces returns by only modest amounts because of the high and speedy rate of write-off. The impact is obviously stronger on the smaller fields. Under the Medium Price scenario the rate of return falls from 33.3 per cent to 30.5 per cent on the LV field. On the LLV field the return falls from 1.1 per cent to 0 per cent, but on the larger fields it is reduced by less than one percentage point.

Under the new rules, however, the picture is different. For an ongoing investor the fall in the post-tax rate of return falls from 33.3 per cent to 25.2 per cent on the LV field and from 23.3 per cent to 20.7 per cent on the MV one. On the larger fields the decrease in the rate of return is still very small.

(i) Exploration Risk Adjusted Returns

The explorationist cannot be certain of making a discovery. It is thus important to incorporate the exploration risks into the analysis. A case where the chance of discovery is 1 in 5 has been examined. A convenient way to incorporate the effects of this is to calculate risk-adjusted rates of return. This is achieved by incorporating an exploration programme of five times the base amount noted above. The consquential pre-tax and post-tax returns are shown in **Table 3.**

The results indicate that NPVs are generally reduced substantially by the tax system under the relatively expensive exploration programme. It is also evident that the returns under the new rules for exploration relief for PRT are significantly less than under the old terms. The differences are particularly noticeable on the smaller fields. Under the new terms in conditions where no PRT is payable on these fields effective PRT relief is not obtained. Under the new terms it is conceivable that exploration disincentives could emerge.

The results also show that when full immediate relief was available for PRT the rate of return could sometimes be enhanced by the allowances. At high rates of discount the present value of the allowances could be so large in relation to the subsequent tax payments that the discounted rate of return could be increased. In the case of small fields, though immediate reliefs for PRT were available, no PRT payments were made on the field's income with the result that the discounted tax take could be negative.

Conclusions

Despite the dramatic fall in oil prices in 1986 investment in onshore exploration and development can still remain attractive. Very small fields of 0.5 million barrels or less of recoverable reserves may not be viable on a pre-tax basis and larger fields requiring considerable gathering facilities and water injection (or substantial environmental expenditure) may also be fairly marginal on a pre-tax basis depending on assumptions regarding future oil prices.

The tax system is generally regressive in its impact both with respect to changes in oil prices and exploitation costs. The royalty is primarily responsible for this outcome. PRT is payable only on comparatively large fields. The fiscal system is much more regressive in present value terms than on an MOD basis with the royalty again playing a main causal role. The fiscal system could lead to some field developments being inhibited though most will probably proceed if they are viable on a pre-tax basis.

Under the situation with offshore fields the advantages of ongoing operations from a fiscal viewpoint are comparatively small for onshore investors. The lead time between initial investment and first production is quite short and the value of tax savings correspondingly small.

Project completion delays can significantly reduce post-tax returns. The precise effect depends upon the behaviour of oil prices. In some circumstances project delays could bring substantial benefits as a result of higher future oil prices.

At the exploration phase it is clear that on a risk-adjusted basis the fiscal system can have a significant effect on the viability of a programme, especially if the risks of not making a discovery are considerable. The recent changes to the system of reliefs for exploration costs for PRT reduce the exploration incentives considerably, with the size of the disincentive being directly related to the exploration costs, the greater on the smaller fields where no PRT is payable. ●

*The financial assistance of the ESRC greatly facilitated the research work for this paper. Professor Alexander G Kemp's and David Rose's paper was originally presented to the Landward Oil and Gas Conference organised by IBC Technical Services Ltd in London in Nov 86.

LPG leak from HF alkylation unit

LPG leaked from a hole in the outlet pipework of a heat exchanger with potentially serious consequences. The leak occurred on a unit which reacts isobutane and butylene in the presence of a hydrofluoric acid catalyst to produce alkylate for motor spirit blending. This process is used in many refineries.

The pipe which leaked was one leg of an isobutane recycle stream which is used to provide heat to a number of exchangers (see *Figure 1*). This isobutane stream contains residual amounts of HF carried through from the reactor circuit: in the range 0.1% to 0.2% by weight of HF.

The exchanger where the problem occurred is a two shell unit, E-3A/B, operated in parallel, and the liquid outlet line from one of the shells (B) was found after the incident to be completely blocked with sludge over approximately one metre. The leak hole was a split about 30 mm long and 10 mm wide (maximum), located in a band of severe thinning approximately 50 mm wide running circumferentially around the pipe. This severe localised corrosion appeared to be worst at the interface between sludge and the process stream. It is presumed that the low flow or static conditions facilitated the high rate of local corrosion.

X-ray examination of the liquid outlet from the other shell, E-3A, the common downstream pipework and the equivalent pipework of the other exchangers on the isobutane recycle loop revealed no problems. The sludge was mainly iron fluoride.

These are the possible causes for the build-up of sludge:

- There had been several start-ups and shutdowns of the unit in recent months, including a major inspection overhaul. The thermal cycling and disturbances during these might have dislodged scale and corrosion products. Also, the tube side of E-3B had been cleaned (hydrojetted) twice in situ.
- The exchanger E-3A/B is the last exchanger on the isobutane recycle loop.
- The blockage was at a low point on the circuit.

Possibly the most significant point is that the exchanger, E-3A/B is designed with shells operating in parallel. The only factor which determines equal flow through the two units is the symmetry of the pipework. The exchanger final calculated pressure drop is extremely low (0.01 bar), so any imbalance in the parallel flow patterns would not be readily self-balancing.

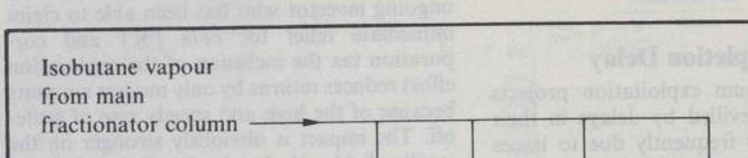


Figure 1

Even at the exchanger design isobutane throughput rate, the fluid velocity in the individual shell outlet pipes would be quite low at 0.6 m/sec. For operational reasons, the exchangers had recently been run at well below design rates. Either the differential pressure was insufficient to dislodge a pre-existing plug of sludge or the velocity was insufficient to keep the sludge particles in suspension, and these dropped out and formed a plug.

Although E-3B isobutane outlet was completely blocked, effectively halving the exchanger surface, no operational difficulties were experienced which could have given an early warning. A combination of exchanger oversizing and supplementary heat from a steam heated reboiler coped with the required heat duty.

The butane splitter column is sometimes operated with the remainder of the plant shut down, including the isobutane recycle loop, the heat coming from a steam heated reboiler. Since the shell sides of E-3A/B are directly connected to the column boot, these exchangers will be kept hot. This may create conditions where more rapid corrosion can occur or may cause gassing-up and flow imbalance when restarting isobutane flow.

Irrespective of the mechanism of plugging, an environment was formed which allowed rapid localised corrosion in a process stream which had not formerly been regarded as a problem, and which, in terms of inspection, was previously given a relatively low priority. ●

The incidents reported here have all occurred. Reports of incidents of general interest for publication and readers' letters relevant to individual incidents are always welcome. It is emphasised that neither the name of the company nor the location involved will be divulged. Incidents and letters will be assessed by a *Safety News* technical panel with a view to publication. However, the IP does not have the facilities to pursue technical enquiries related to individual incidents.

The safe keeping of LPG

The Health and Safety Executive has revised its guidance note on the safe keeping of Liquefied Petroleum Gas (LPG) in cylinders and similar containers after detailed discussions within the LPG industry and consultation with interested parties.

The guidance note is intended for all who handle or store LPG in cylinders in workplaces covered by the HSW Act and it may be used as a guide to good practice in other circumstances such as the storage of LPG at home.

The well-illustrated guidance provides advice on the properties of LPG, the safe storage of cylinders and other containers both inside and outside buildings, fire protection and emergency procedures as well as advice on the small scale storage and display of LPG at retail premises.

CS4 ISBN 0 11 883539 4. Available from HMSO.

Lighting standard lifting cable snaps

A 5 lamp assembly had been lowered from its position at the top of a 40′ pole to about 6′. Electrical maintenance work was completed and the operator prepared to hoist the assembly back up the pole. To do this he had to stand inside the framework of the assembly, attach a short (12″) winch handle and commence winding.

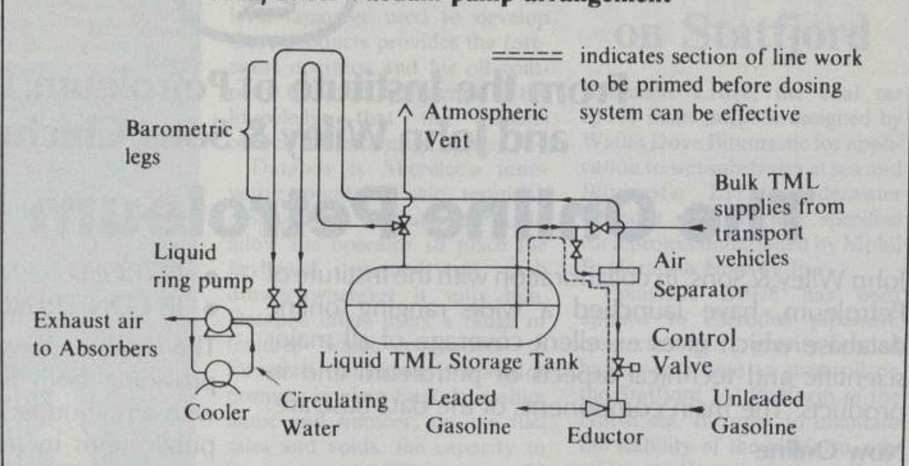
Almost immediately a cable broke and the assembly dropped, striking the operator. Fortunately he was only slightly injured. Investigation showed that the compensating cable appeared to have been nipped, and then broke owing to the transmitted strain from the main winch cable.

This type of equipment is in fairly extensive use and since the cables are not subject to regular statutory examination, local maintenance and inspection procedures are very important.

An operator should not have to stand directly under the assembly as it is raised/lowered. Consideration should be given to fitting a winch handle with an extension, to ensure that the operator is outside a likely impact area. This would be preferable to any form of overhead protection for the operator.

Vacuum pump explosion

TEL/TML Vacuum pump arrangement



A liquid ring vacuum pump, used in the handling of tetra ethyl lead (TEL) and tetra methyl lead (TML) for gasoline dosing, exploded. It was being used at the time to prime a TML dosing system, (ie remove air). It is thought that the cause of the explosion was thermal decomposition of liquid TML in the pump such as can take place at temperatures as low as 100C.

It seems probable that the TML disentrainment facilities in the vapour line to the pump were inadequate and that overheating of liquid TML carried over, occurred in the pump due either to inadequate cooling of the working fluid (water) at the time, or to a hot spot within the pump.

The vacuum pump system will not be used in future to prime the line between the TML stock tank dip leg and the eductor of the gasoline blending system. The linework is being modified to enable the eductor itself to prime the line.●

Explosion in hospital heating fuel tank

An explosion occurred in a small vertical fuel oil tank associated with a heating plant at a hospital. There were no injuries, but the tank was extensively damaged.

The tank, which was heated by an electrical immersion heater, was being emptied for cleaning. The operator, whilst emptying it, left the immersion heater on to reduce the oil viscosity and then left the site while this operation was being carried out. An explosion occurred which ruptured the roof and extensively damaged the tank shell.

It has since been established that neither the low level alarm nor the thermostat operated and that the tank vent was blocked. There was no oil in the tank at the time of the explosion.

Instructions have now been issued on the strict observance of the following precautions in this type of installation:

- ***a*** The level of fuel oil in an electrically heated tank must always be at least one foot over the top of the element, when elements are in use.
- ***b*** Low level and high level alarms must be regularly checked for correct operation.
- ***c*** The tank vent must be regularly inspected to ensure a free flow of air during filling/emptying operations.
- ***d*** The thermostats must be regularly tested to ensure automatic cut off at the correct temperature.

The possibility of installing interlocks between immersion heater electrical supply and fuel oil level is being considered.

It is noted that there is an HSE warning notice on this subject 'Warning-Danger of explosion in oil storage tanks fitted with immersed heaters.' ISBN 0 11 883088 0; available from HM Stationery Office.

Dangers of improvised work benches

Confined spaces in which LPG vapour can build up need not be below ground level, but may be seemingly innocuous items such as drums or cans.

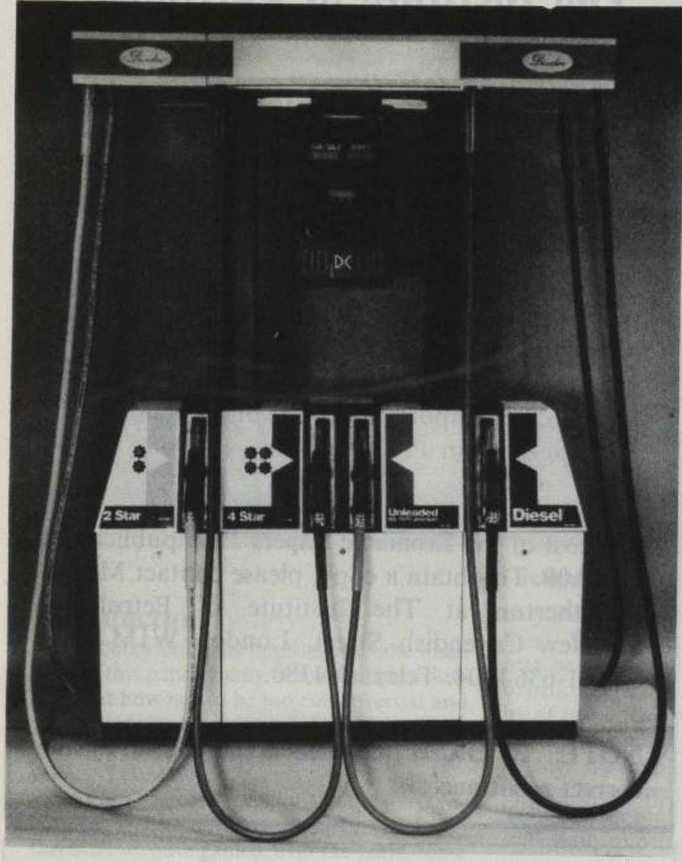
A plater in an oil rig construction yard was killed when propane inside an empty drum exploded. He was using an oxy-propane cutting torch to make supports and brackets in a small jig. The work was being carried out on an empty 45 gallon drum which he was using as a work bench. The drum had two holes in its lid.

The plater had worked all morning, and about half-an-hour after he had returned from his lunch break, there was a loud explosion. Tests on the cutting torch showed that both propane and oxygen were leaking from loose union nuts. It was probable that the gas had leaked into the drum for up to 45 minutes over the lunch break, while the torch was left on or in the drum. In addition, propane may have built up in the drum during the morning's work. The source of ignition was never discovered, but was probably either the flame of the torch or hot slag.

Drums or cans should never be used as improvised work benches for welding or cutting. In addition to the risk of igniting a build-up of gas such as in this case, the drums or cans often contain flammable residues which can be ignited by the torch or hot slag. It is essential that all cutting and welding torches are properly maintained and checked regularly.

This item and The Safe Keeping of LPG have been reproduced by kind permission of the Health and Safety Executive.

Micrelec/Dunclare in retail display



Dunclare's Freeway Super Multi-Hose Pump

At a recent exhibition near Woking to display their latest products, Micrelec Plc and Dunclare Dispensers (UK) Ltd laid special emphasis on electronic dispensing pumps and the Micrelec Point of Sale and back office Accounts package.

Dunclare's pump range covers Mono, Duo (1 product), Duo (2 product), Twin, Blender, High Speed Diesel, Quadro (both Prestige and Freeway models) and 6 and 8 Hose Super Multi-Product Pumps. This range is fully compatible with the Micrelec product range including Decal 2/Recal Pump Controllers, Datapos, Card Swipe and Datamanager to Support Account Functions — totally integrated from tank to bank!

To complement the Dunclare pumps, forecourt card and note acceptor terminals can be installed and interfaced with this range of equipment. The high level language used to develop these products provides the forecourt operator and his oil company with full confidence in the knowledge that the systems offered are extremely secure.

Datapos is Micrelec's innovative point of sale terminal, designed in modular form to allow the operator to place the keyboard, printer and cash drawer wherever it suits him. Datapos offers users a range of features which contribute to forecourt efficiency: operator prompts in plain English; cashier name and number; on-line fuel sales and voids; the capacity to log up to 1500 prices, 25 departments and eight levels of VAT; fully descriptive receipts and credit card vouchers; a shift changeover facility and many others.

Peripheral devices such as card readers can be added at a later date. Maintenance can be carried out with little or no disruption to business because the electronics are housed separately in the MICROBOX station controller. Datapos offers a full range of management reports too.

Datamanager comprises a series of computer software packages developed specifically for the petroleum retailer's back office. The programs include simple data input and output handling for Datapos and full station accounting packages. When the micro computer using Datamanager is linked with Datapos, tasks such as price input, stock control and management reporting can be handled in the back office; the kiosk can then be dedicated to pump control, selling and payment.

Robot buggy goes underground

The manufacturers of a new robot buggy claim it will go where divers fear to tread. The buggy looks like something from the space programme yet is designed to operate at depths of 400 metres below the surface. It can be sent into the underwater end of an outlet from a power station or chemical works and then make its way for nearly a mile along the inside of the pipe checking for corrosion or damage.

The robot is taken to the dropping zone and then lowered in a lift cage into the water. Two propellers on the cage allow the controller on the boat to accurately guide it into position at the end of the outlet.

When the cage reaches the sea bed the four-wheeler buggy rolls down a ramp into the pipe — which must be at least five feet wide — and moves along it at half a knot.

The buggy manufactured by a French company called Hytec and based in Montpellier, has a gyroscopic guidance system with two-axis inclinometer, pressure sensor, distance meter, sample container, powerful lighting, colour and monochrome TV cameras and a hydraulic arm.

Special tools can be fitted to the hydraulic arm to allow the buggy to install sensors in the pipe or make repairs.

All the information and commands are transmitted back and forth down a life line link with the boat where the operator can follow the buggy's progress on TV monitors and control all the robot's functions.

Hytec, which stands for Hydro Technologie, originally developed the system to allow Electricite de France to inspect radioactive effluent pipes from their nuclear power stations.

Coal tar epoxy paint used on Statfjord

Epimastic L1078, the coal tar epoxy paint purpose designed by Wailes Dove Bitumastic for application to wet substrates at sea and Bitumastic L1174 underwater adhesive were recently specified for a project undertaken by Mobil Exploration Norway Inc.

Epimastic L1078 has been applied to corroded pipework connected to 18 gravity located ballast cells used to store oil on the Statfjord 'A' Platform in the North sea. In order to maintain the stability of the platform, any oil pumped out of the cells is replaced with water.

In order to repair the corroded pipework, Mobil Norway cut into the sections of steel, replacing it with titanium metal. The pipework, 42 inches in diameter, was re-flanged by cutting back the cement, and Epimastic L1078 applied to the steel, cement and flanges. Where a high build for repair was required, the Bitumastic L1174 was used as a filler.

The input pipe which carries the water was isolated by an ice plug before application of the protective coating and other repair work could take place. The work was carried out approximately nine metres away from the ice plug in a time of just 16 hours.

Wailes Dove Bitumastic is based in Tyne and Wear.

PLC's appear in control panel

A new design of control panel assembly incorporating the latest programmable logic controllers (PLC's) has been developed by BOC Limited.

One such system has been built for BOC by Durr Control Systems (DCS), a division of Durr Ltd, Warwick, for inclusion in a project for treating the effluents produced during metal processing.

Based on BOC's patented 'Vitox' process, whereby oxygen rather than air is utilised to speed the bacterial conversion of waste, the project comprises three reaction tanks with individual pumps, while a fourth standby pump is provided which can be switched into any tank. Two panels are being manufactured by Durr, as the customer specified that the motor control and instrumentation systems should be housed in existing separate rooms.

IP WEEK 1987 LONDON

16th-20th February

The Programme of Events organised by The Institute of Petroleum for IP Week is as follows.

Please send me details and an application form to attend the following events:
(Please tick where appropriate)

Monday, 16 February

Maureen Lynch, Vice-President Research, the New York Mercantile Exchange (NYMEX), will talk to members of the Institute's Energy Economics Group on the progress of the oil futures market in the US. ☐

Tuesday, 17 February

A morning meeting on Oil Price information, with three presentations, and displays by petroleum price suppliers, will be held by the IP Information for Energy Group. ☐

Sir Peter Walters, Chairman of the British Petroleum Company plc, at an Institute of Petroleum Luncheon, at the Inn on the Park Hotel, London, will give an industry view of the oil price crisis. ☐

Jonathan Stern, a leading authority on gas supply and the head of the Joint Energy Programme of the Royal Institute of International Affairs, will make a presentation on natural gas resources in the UK, with options to the year 2000, to a meeting of members of the IP's Exploration and Production Discussion Group. ☐

Wednesday, 18 February

The IP Annual Dinner will be held at Grosvenor House, London, at 6.45 for 7.30p.m. The chief guest, The Secretary of State for Energy, The Rt Hon. Peter Walker, M.B.E., M.P., will be the main speaker.

For information regarding the Annual Dinner, please contact Caroline Little at The IP.

Thursday, 19 February

Mr John Went, Marketing Manager, Centre-File, will address a meeting of the London Branch of The Institute of Petroleum on the problems and opportunities for petrol retailers in electronic funds transfer at point of sale (EFTPOS). ☐

Friday 20 February

The Rt Hon. The Lord Boardman, MC, TD, DL, Chairman of the National Westminster Bank plc, will address an Institute of Petroleum Luncheon at the Savoy Hotel, London, when he will give a banking view of the oil price crisis. ☐

Name...

Address..

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All meetings at The Institute of Petroleum unless otherwise stated.

Please return to: The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: 01-636 1004.

A New Publication from The Institute of Petroleum

PAPERS ON ECONOMICS 1986

The Institute of Petroleum **PAPERS ON ECONOMICS 1986** is now available. The publication includes papers and reports on presentations at the Oil Supply and Price conference held in November 1986, and important articles on economics that have appeared in *Petroleum Review* during 1986.

The cost of the **Economic Papers 1986** publication is **£12.00**. To obtain a copy, please contact Mrs. J. J. Etherton at The Institute of Petroleum, 61, New Cavendish Street, London W1M 8AR. Tel: 01-636 1004. Telex: 264380.

NOTE: All Orders must be accompanied by the correct remittance.

EXPLORATION AND PRODUCTION DISCUSSION GROUP

The January meeting of the E & P Discussion Group will be held at the Institute of Petroleum on Tuesday the 27th January 1987 at 5.30 pm. (PLEASE NOTE THAT FOR UNAVOIDABLE REASONS THIS IS A DIFFERENT DATE TO THAT PREVIOUSLY ADVERTISED)

Mr Preston Mason, Managing Director, and Mr Mike Whiteside, Operations Manager, of Seaflo Systems Ltd will provide a joint presentation on:

Subsea Production Systems extend the Life of existing Platforms

The presentation will describe developments in subsea systems which now enable satellite fields to be tied into nearby producing platforms at greatly reduced costs and with much improved flexibility so that early cash flow and enhanced field economics can be achieved.

In addition to showing that these fields have excellent economics even at today's oil prices, it will be shown that production from them can have the effect of increasing the life of existing platforms and thus the ultimate hydrocarbon recovery.

Tea will be served from 5.00 pm.

The February meeting of the Group will be held at the Institute of Petroleum on the 17th February 1987 at 5.30 pm when Mr Jonathan Stern, Joint Energy Programme, Royal Institute of International Affairs, will speak about Natural Gas in the UK: Options to the Year 2000.

If you wish to be placed on the mailing list of the E & P Discussion Group or obtain information about a particular meeting please contact Mr AE Lodge at the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: 01-636 1004, ext. 236.

Offshore helicopter firefighting and rescue training

by Gordon Allen, Senior Fire Instructor, Offshore Petroleum Industry Training Board


Firefighting and rescue from a Sikorsky S61N

Introduction

Whilst considering the approach to take when writing this paper, many of my thoughts were aimed at how not to be too controversial and yet put over my own views and the views of my colleagues with regard to Helicopter Fire and Rescue Training.

At the Offshore Training Centre we commenced Helicopter Fire Training in 1979, therefore we have gained, over the years, some considerable experience and expertise in this field. We have trained a considerable number of helideck personnel in these six plus years and our course is still very popular. In 1985, we were forced, by demand, to increase the number of courses planned for that year from twelve to twenty two.

The reason for our popularity in this field, is that we have never become complacent and constantly update our course programme, facilities, instructor training etc. with a view to keeping a high level course. In all too many cases, training establishments construct a mock up helicopter or buy a redundant helicopter, then advertise helicopter emergency training, without considering the various attitudes a helicopter could adopt in a crash situation. In this case, these establishments may not be doing justice to the training required for helideck personnel.

Helicopter emergency personnel

On most helidecks, the number and designation of personnel manning the emergency equipment varies immensely. I have on occasions witnessed as few as two and as many as eight personnel manning decks during helicopter movements. There is no laid down requirement regarding the number of personnel, but it is suggested by some operators that a minimum of three should be in attendance. I personally view four as being a more realistic figure, but certainly not less than three.

In many cases, the personnel who man the emergency equipment on a helideck, do so as a secondary function, ie. their main function may be crane operator, roustabout, general hand. Whilst accepting that these personnel may be quite capable in the general handling of helicopters, one must question in the majority of cases, their aptitude to perform a satisfactory role in an emergency.

Does the employer take this into consideration when recruiting helideck personnel? Training can in most cases develop a person sufficiently to perform an emergency role, but in some cases, certain phobias will prevent this.

Installations offshore

Before considering training, one must consider the problems involved with offshore structures engaged in helicopter movements. These structures could be fixed oil installations, floating oil installations, service installations such as drilling rigs, accommodation rigs, pipe laying barges etc, or vessels serving a support function. All of these have their own particular function and potential hazards associated with these functions as follows:

The location of the structure may be many miles from shore and therefore many miles from any potential assistance.

The size of the structure has a considerable bearing on problems ie. the larger the structure the more personnel on board and therefore the larger life risk.

What is the function of the structure, ie. is it a producing platform, drilling rig, is it producing gas or oil or is it performing a service function?

Where is the helicopter landing facility in respect to other areas of the installation? What possible effect could a helicopter incident have on processes being carried out?

Probably the most important factor is what effect the sea, wind and weather may have on any helicopter operations. In certain sea states and wind states, helicopter operations must cease.

This paper was presented at Helitech '86 in Aberdeen

There are many other factors which effect the security of installations during helicopter operations, but the main point for consideration should be the alertness and expertise of the helideck crew in dealing swiftly with emergency. If the helicopter shell stays intact, it will take approximately three minutes for a fire to seriously affect the personnel inside, therefore, if the crew are prepared they will have half a chance, if they are un-prepared, they will have no chance.

Offshore helicopter incidents

Recorded incidents involving helicopter emergencies on offshore installations are few and in most cases, of a minor nature. This gives some considerable confidence in the safety of the helicopter as a means of travel offshore.

There have, however, been at least two incidents which have occurred on installations in the British sector of the North Sea where helicopters have crashed and ignited and emergency crews have had to perform their emergency function.

There have been many recorded incidents throughout the world where helicopters have either crashed into the sea or on land, and in many cases there has been a large loss of life.

In considering these incidents, which are few in number, we must work on the theory – 'if it can happen, it will happen'. We must not be complacent, we must train our helideck personnel to a very high standard in an effort to successfully deal with any incident in its incipient stage and so secure the safety of personnel and plant.

Aircraft fire training establishments

As mentioned earlier, there are a number of training establishments which have introduced mock ups and advertised helicopter fire training. In most of these cases, they have set the mock up on its wheels on a simulated helideck. As most people will realise, this is the most unlikely attitude – a helicopter will rest in after a crash. Although it is important to have a helicopter in this pose to simulate smaller type fires, it is equally important to have mock ups in other poses to deal with different types of incidents. To construct the helicopter mock ups or props is very costly and most prohibitive to many training establishments.

On investigating the numbers, locations and types of aircraft fire training and rescue establishments, it was quite difficult to find establishments which undertake courses that deal specifically with helicopter fire and rescue. Most of these establishments deal with helicopters as part of their full course on aircraft firefighting.

The organisations which deal with more helicopter training than any other are of course the armed forces. They are undoubtedly the experts in this field and it was with considerable help from the Royal Navy and the Royal Air Force that we set up our helicopter training at Montrose in 1979. We still have a good liaison with the armed forces and the helicopter operators with regard to updating of information.

Recently I visited the Royal Navy School at Culdrose in Cornwall to view their fire training facilities. I was most impressed with the facilities and with the type of courses available. Although the courses involve structural as well as aircraft firefighting, considerable time is spent on helicopter fire training. The main courses run at Culdrose are the seven week course for aircraft handlers, five week course for Leading Hands, and three week course for Petty Officers. All of the courses involve both practical and theoretical training.

The aircraft fire and rescue training is similar to the training undertaken at Montrose where the technique taught is the quick knock down of the flame and rescue undertaken. Working on the assumption that they always have a limited amount of extinguishing medium available, they never go for overkill just in case they run out and fail to complete the rescue.

The main differences between the two training establishments is that the Navy use Aqueous Film Forming Foam, Fluoroprotein Foam and Halon, we at Montrose train with chemical powder, and CO_2 as well as these three mediums. The Navy use all wool protective clothing with full protective headgear, whilst we use cotton overgarments and partial head protection.

The other main armed forces training estab-

Extinguishing a large spill fire under a Chinook, using foam

lishment is located at Royal Air Force Central Training School at RAF Manston. This establishment is responsible for training emergency crews on RAF airfield establishment.

The course consists of a total of six weeks, four weeks involved in basic fire training followed by a further two weeks on aircraft fire and rescue. Helicopter training is included in this two weeks, but if the airfield where emergency crews are posted is involved in helicopter operations, then continuous in-house training will occur.

The Civil Aviation Authority at Teesside Airport is the official establishment for training airport firemen throughout the United Kingdom. Their basic fire course is of four weeks duration, followed by a three weeks course on aircraft fire and rescue. For personnel involved in emergency operations on smaller airfields, the three week course may be replaced with a course of one week duration. This would involve emergencies in smaller aircraft and would include helicopters.

All of these fore-mentioned establishments, run regular refresher training courses to enable the emergency crews to keep well versed in up to date firefighting and rescue techniques.

Aircraft movements

With regard to aircraft movements, comparisons can be made between offshore installations and shore based establishments. In the main, most onshore airfields handle many more movements than their offshore counterparts. However, there are a number of exceptions such as the Shell installations in the East Shetland area, where, on a busy day, these helideck crews can handle in excess of 300 helicopter movements, and in the BP Forties field there can be in excess of sixty movements in a day.

Again, bearing in mind the remote location of offshore installations and the number of hazards associated with these installations, what level of training do the helideck personnel require on these installations? Do they require the same extent of training as the Navy, Air Force or Civil Aviation Authority for instance? I think not, although I do think that they require to be trained to a high standard, I feel sure that this can be achieved in a shorter duration course.

Prerequisite training

Personnel involved in a helideck emergency crew are no different from any other personnel involved in a specialist emergency function, they require specialist advanced training. This cannot successfully be done without an acceptable level of basic fire training. What is acceptable may vary from company to company, but in general terms the training must contain a high practical level. The duration of the course may also vary but the objectives should be to give a satisfactory level of confidence in the equipment and extinguishing mediums used. The content of the course should cover the following subjects:

The course should commence with a theoretical session covering fire chemistry, fire extinguishing mediums, fire equipment operation including the advantages and disadvantages of the equipment.

This should be followed by the practical use of portable and semi portable fire equipment used in first aid firefighting and the practical use of water equipment such as hose, branch pipes, portable and fixed water monitors.

Theoretical and practical application of foam including the practical use of portable, semi-portable and fixed foam equipment.

Using monitors to extinguish a large helideck fire

Extinguishing a Chinook fire

Theoretical and practical use of breathing apparatus. Commencing with a description of the set in use, familiarisation of the wearing of the set and practical exercises to build up the confidence in the wearing of the set.

At Montrose we have proved that a satisfactory level can be achieved in a course of four day duration and only courses with this content will be accepted as a prerequisite for helicopter fire and rescue training at Montrose. This may sound as if we are attempting to keep ourselves in work, but without this level of student, it would be impossible to attain the required level in helicopter training within the duration of the helicopter course.

Fire and rescue training facilities

As mentioned earlier, to perform this type of training to a satisfactory standard, it is important that the training establishment has sufficient realistic facilities available to it. Having visited RN Culdrose, I was most impressed by the realistic aircraft mock ups and of the number of redundant aircraft placed in various positions and used mainly for rescue purposes. On information I received, I suspect that RAF Manston is quite similar to Culdrose.

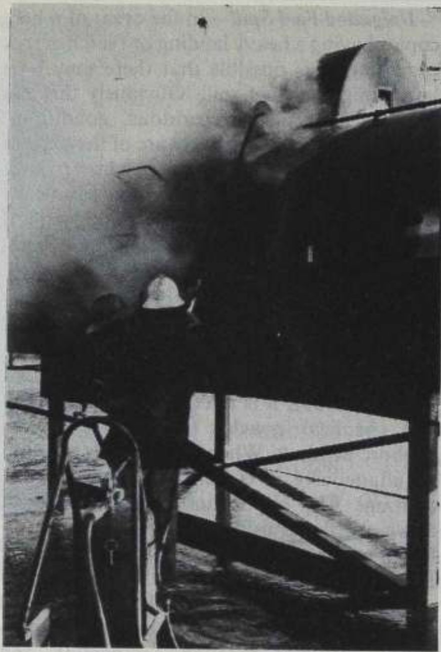
Whilst endorsing that these facilities are excellent for their main purpose of airfield fire and rescue training, I must emphasise that thi; paper and presentation involves Offshore Fire and Rescue training. At the Fire Training Centre, Montrose, the mock ups are in the main very similar to other establishments doing helicopter fire training, but they have been placed in various attitudes to simulate a variety of emergency incidents which may occur offshore.

A redundant RAF Rescue 'Whirlwind' helicopter was purchased in 1979 on our behalf by Shell Expro, and transported by road to Montrose. Its main use is for rescue exercises and it is used extensively for this purpose. However, the 'Whirlwind' still retains the fixed fire protection/detection system as well as battery and fuel isolation points. These are also utilised during instruction.

The first mock up of a helicopter was constructed in 1979, and set in an upright position on our Ground Helideck. It is a mock up of a Sikorsky S61N helicopter. This mock up is used extensively in exercises involving large spill fires, rescue exercises, engine fires, fires in cargo space and internal fires. So extensive is its use, that we have had to do a major refurbishing job on it this year to bring it back to its original state.

We had a further S61N mock up constructed in 1982 to be used specifically for rescue and therefore constructed of much lighter material. We fixed this mock up at an acute angle against Fire Module number 1 simulating a crash into the structure or a situation where the helicopter has fallen from the helideck. The prop in this position has the advantage that it can be used to teach the many and varied techniques used to rescue personnel and handle casualties.

On appreciating that the Sikorsky 61 is not the only helicopter operating in the North Sea, we decided to construct a Bell 212 mock up.



Extinguishing an engine fire using BCF

This was constructed by our own centre engineering staff and is located on the helideck of fire module number 1. Used almost exclusively for spill fires and rescue purposes, it is laid on its side, giving quite a difficult access. In fact, ladders would have to be used when effecting a rescue from this mock up.

The Vertol Chinook was then introduced into the North Sea to transport Shell personnel to their respective installations. With this in mind plans were drawn up with a view to constructing a mock up of this aircraft. The mock up was eventually delivered in the spring of 1985 and after some modification went into use in the summer. The prop is located on the helideck of Fire Module number 2. This helideck is fitted out with the most up to date fire fighting equipment. This includes oscillating monitors which are connected to foam proportioning units, twin agent firefighting unit and the normal portable fire equipment found on a helideck. The Chinook mock up can be rotated through 360 degrees and can be either positioned horizontally, or with the rail or nose facing downward. The mock up is used extensively for spill fires, internal fires and rescue. As far as I know, there is no other mock prop with such versatility as this throughout the UK.

There are so many different types of helicopter now operating in the North Sea, that it is very difficult to have a mock up of each type on site. However, one of our instructors designed a prop which was constructed this year to simulate various helicopters on their side. This prop has various access points depicting different helicopter emergency access. The prop is of course used specifically for emergency rescue and casualty handling and is fitted out with seats complete with seat belts.

Although these props are designed to cover a large proportion of possible incidents, we can never be complacent and our staff are constantly forwarding proposals for new designs, change of design and general updating of these props. This we feel is an essential part of running a successful course.

Helicopter course content

When designing our helicopter course content in 1979, we were a bit surprised and slightly concerned that the course was to be of only two days duration. We had to design a programme with this duration in mind and with the assumption that the course would be mainly practical, with the minimum of time spent in the classroom. We went ahead with our course preparation, structuring it so that we could spend the first part in the classroom (approximately 2.5 hours) with the remainder of the time in a practical situation. As I mentioned before, our course content has not been radically changed over the years, it has however been added to as new information and new facilities became available.

Legislation has considerable bearing on helicopter emergency training owing to the type of equipment required on helidecks. Statutory Instrument 1019 covers the manning of helideck and the emergency equipment required for gaining access to the aircraft. It is important to give a view of this equipment, showing the various uses that it can be put to. Statutory Instrument 611 covers protective clothing, fixed and portable fire equipment and fire extinguishing medium. A full description of the various types of clothing should be given, with discussion on advantages and disadvantages. Clothing is one of the most important subjects on the course and can be most controversial. Fire equipment should be related to the helideck with regard to positioning etc.

Helicopter Construction – in an effort to enable trainee's to understand the effect a crash or fire may have on a helicopter it is important that some discussion takes place with regard to helicopter construction. In most cases the helicopter is of a similar construction to conventional aircraft, but the structural members are of a much smaller cross section and the cladding of a thinner gauge. It is, therefore, fair to assume that this structure may break down quicker in a severe fire situation. With this in mind it is therefore most important that the emergency crews are trained to a high standard and to treat all helicopter movements as potential hazards. Having seen helicopter airframes after a fire situation, break down occurs after a relatively short time of exposure to fire.

Helicopter Rescue – Owing to the numbers of different types of aircraft operating offshore, it is important to discuss the various types and locations of emergency access. This can normally be achieved by using a slide presentation. In discussing the break in points, the various tools and techniques should once more be mentioned. It is also important to mention electrical and fuel isolation points, harness release and any other hazards on board such as emergency flares etc.

Fire fighting – In the event of a helicopter crash occurring, there is a more than average chance that this will be accompanied by fire. It is therefore important for the emergency teams to understand the techniques and procedures used when dealing with the incidents. There can be no clearly defined way of dealing with specific situations and in many cases on the spot decisions will have to be taken. There are however some ground rules used as guidelines, the obvious must be an immediate attack to keep flame impingement away from the aircraft. In making this approach, a path must be secured to allow safe passage for passengers escaping from the aircraft to a safe area. At all times a clear line of retreat must be secured to facilitate any change in conditions. Crews must be fully aware of their need for personnel protection and the advantages/limitations of the equipment in use.

Practical Training

Unfortunately on a standard helicopter course, our experience has been that the knowledge of the trainees has varied considerably from company to company. In many cases, trainees have not had any formal training for a number of years. It is therefore most important from an instructional viewpoint to appraise the level of the trainee. This can be done quite successfully by giving them the opportunity to use some portable and semi-portable equipment on live fire situations.

Rescue Procedures – Owing to the many and varied ways in which rescue from a helicopter can be carried out and any further circumstances prevailing at the time such as fire and smoke, it is important to spend some time on rescue. To ensure that the basic rescue procedures are being fully understood, these rescues should be carried out without the added pressure of smoke and heat. The rescue exercise should cover as many eventualities as possible, from straight forward evacuation to complicated exercises using breaking in tools. Exercises using breathing apparatus and stretchers must also be included. In many cases, helicopter passengers may be attempting to vacate the aircraft as the emergency crew are making their entry or attacking the fire, it is therefore important to ensure that trainees are aware of this possibility and how to deal with it.

Engine Fires – Probably the most common fires in helicopters start in the engine compartment and although helicopters differ considerably, they are all subject to this peculiarity. The fire in most cases will self extinguish or be extinguished with the fixed protection system but nevertheless, trainees must be given the opportunity to use the two extinguishing mediums required under Statutory Instrument 611, carbon dioxide or Halogenated Hydrocarbon (Halon). Instruction should be given as to the advantages/disadvantages of each and procedures to be adopted after use.

Internal Fires – There have been many recorded cases of different fires occurring inside the aircraft, involving seating, batteries, electric wiring etc. All of these types of fire will be accompanied by toxic fumes. This smoke will severely affect the emergency crews as well as any passengers. There are many who view the use of breathing apparatus on helicopter fires as unnecessary. It is however our view that it is an important item of any emergency crews personal protection. After all, if the emergency crew feel insecure, then they may not be totally mindful of the task in hand. At Montrose, we tended to use carbon dioxide or chemical powder on internal fires, but during my recent visit to Culdrose, I was interested to hear that the forces use BCF on internal fires.

Unignited Fuel Spill – In the event of a helicopter having a heavy landing or fuelling error occurring, it is possible that there may be a large unignited fuel spill. Obviously this can produce extremely hazardous conditions. Trainee's should be made aware of this type of situation and should be instructed how to inert the spill from a possible ignition source by laying a foam blanket over the fuel spill. It should however be emphasised that foam should not be laid on the deck prior to a helicopter landing, as the downdraft will cause a 'snowstorm' effect with the foam, giving extreme visibility problems for the pilot.

The use of Twin Agent – Under Statutory Instrument 611, it is a requirement that foam and chemical powder are present on an offshore helideck. When these agents are used simultaneously it is called 'twin agent fire fighting'. The application is first to knock down the flame using chemical powder, followed by the application of foam to secure the fire. Not everyone agrees with this principal owing, I suspect to the problem associated with chemical powder, ie, no cooling, maintenance problems through compaction and using it in severe wind conditions. It has however excellent 'knock down' capabilities and if used correctly can be an asset. As was mentioned earlier, the armed forces have discarded powder and are now using a similar technique but replacing the powder with aqueous film forming foam, with a back up of fluoro-protein. However, no matter what the different theory's are on the different extinguishing mediums, it is important that trainees are given the opportunity to use the mediums which they have available in their offshore environment. As most crashes will involve large fires, exercises must be realistic and fires should be of sufficient size to test the trainees to the full, but with sufficient supervision to ensure their safety.

Fixed Fire Monitors – In recent years, there has been more and more emphasis on the use of monitors on helidecks. On some older installations, these are mainly of the manual type, but a number of companies are changing over to automatic monitors, and most of the new installations are incorporating these. Monitors, although extremely efficient and of great benefit on helidecks do have disadvantages and should be complimented with manpower operating portable equipment. In some cases, companies are reducing their helideck personnel on the installation of automatic monitors. It should be realised however, that this is wrong and the two should complement each other. After all, when has a monitor ever effected a rescue? Training should include the use of monitors, therefore allowing trainee's to assess the effect they have in emergency operations.

Fires Involving Magnesium – In older helicopters, magnesium alloys were used extensively in the construction, however this has decreased considerably in recent years. Nevertheless, I feel it is important to demonstrate the action various fire extinguishing mediums have on magnesium. Whilst the result of applying water based substances to burning magnesium produces quite a startling reaction, it should be pointed out that the wearing of the correct clothing will give the emergency crew adequate protection.

Fire and Rescue Exercises – As the course progresses, so then should the complexity of the exercises increase. This we feel is the only way in which trainees gain confidence in the equipment, techniques etc., and it also gives the instructor the opportunity to assess the capability of the trainee. I do not intend to detail each individual exercise content, but each incident should have different problems, such as difficult access to the helicopter, the helicopter is in an awkward position, various problems with regard to casualties, etc. It is encumbent on each training establishment to design their own exercises and decide on the aims and objective of each exercise. On the completion of each exercise, a full constructive debrief should take place to iron out any problems and consolidate the main teaching points.

Conclusion

In the main, operating companies offshore have taken a positive view of helicopter training and their emergency crews have a good knowledge of what is required of them and they are trained to a satisfactory standard. Unfortunately there are some companies who are well behind and still require some prodding to train their crews.

Many people enquire as to a realistic duration for a helicopter course and in fact, as I have done, quote the Armed Forces and CAA as examples. It should be realised that in these cases, these persons are trained for emergencies as their main function, whilst in the case of offshore workers, their emergency roll is the secondary roll. My own feeling is that it depends a great deal on the aptitude of the person as to the length of the course ie. if the person does not have the correct attitude and aptitude then it may be that no amount of training will produce the helideck crew we require.

In most cases, our helicopter course at Montrose consists of twelve individuals, who are perhaps total strangers. In my view helideck crews are equally as important as any other emergency crew offshore and should therefore be trained as a team. Although individuals receive a good ground knowledge of helicopter emergencies, I feel that they would benefit from team training where they can assess their own and their colleagues strengths and weaknesses.

It is important also that training continues on the installation with the particular equipment which is available to the emergency crew. This should be followed by regular refresher training at a recognised training establishment. The interval of such training should adhere to the UKOOA Guidelines on refresher training.

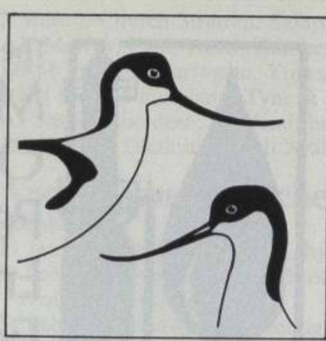
In conclusion, I trust that this paper will be of benefit to the reader in choosing a helideck crew and the relative training. I feel that I have achieved my aim of not being controversial, whilst still putting forward the views of myself and my colleagues with regard to helicopter emergency training. We at Montrose feel strongly with regard to the amount of time and effort required to make this course successful. The course would not be successful without this effort and the expertise of our instructional staff who are always available and willing to discuss helicopter emergencies. ●

People

The cause of conservation has been boosted by the recent announcement of five new awards by the Royal Society for the Protection of Birds (RSPB) and Esso UK, the awards' sponsor.

Outstanding achievements in the field of conservation will be recognised by the RSPB Birds and Countryside awards which fall into five categories: the Individual award, the Industry award, the Media award (for the publication or media organisation judged to have made the greatest contribution), the European award (for the greatest contribution in Europe) and the Esso award, worth £2,000, which will be given to one of the recipients of the above awards.

Magnus Magnusson, president of the Royal Society for the Protection of Birds.



The award scheme was launched by the Rt Hon Nicholas Ridley MP, Secretary of State for the Environment at the Institution of Civil Engineers in London.

When the judging panel has chosen the winners, the awards will be presented in July.

Tankfreight has appointed **Geoff Waddilove** and **David Giles** to head its new network of specialist tanker cleaning stations. Mr Waddilove is product manager and Mr Giles becomes national operations manager.

As part of the reorganisation of the sales and marketing function of Marconi Marine, the company has appointed **Matthew Gould** as marketing manager and **Geoffrey Molloy** as regional manager, Middle East, Africa and Asia. Another new appointment at Marconi International Marine is that of **Martyn Braime** who is now sales and marketing director.

Bechtel Limited, the British subsidiary of the Bechtel Group, has a new finance director: **Chris Holt.**

After several years at Esso Fawley, **Mike Shields** has joined FMA Process Equipment as a sales engineer.

Micrelec has appointed **Simon Gunn** (*above*) as finance director. He joins from GKN where he was chief accountant and company secretary of one of their manufacturing subsidiaries.

Total Oil Marine has appointed **Jean-Claude Barbier** as its Aberdeen district manager.

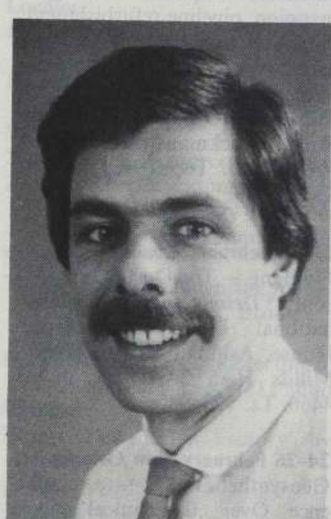
R J Brown and Associates has appointed **Dr Thomas Labiosa** as general manager of R J Brown and Associates (UK) Ltd.

Robert E Howson has been named president and chief operating officer of Babcock & Wilcox, succeeding **Walter M Vannoy** who will become vice chairman of McDermott International Inc of New Orleans until his retirement in 1988.

In a move to strengthen its UK sales operations, Girdlestone Pumps has appointed four area sales engineers: they are **Alan Ward, Chris Bradley, Colin Calver** (*right*) and **Martin Butcher** (*left*).

Kenneth G Berry, formerly of Esso Europe, has been appointed general manager of the Oil and Pipelines Agency's Land Pipelines Department.

Tricentrol has announced a reduction in the size of the Board. **Hamish Orr-Ewing** and **Rex Chester** have both resigned as non-executive directors. **John S Raitt** is now managing director in place of **Roger J Smith** who will remain deputy chairman.



The third Mobil Design Award for Small Firms has been won by a Rotherham scissors manufacturer. The Company, Russell Shears, decided to fight the growing influx of imported scissors by producing a new range of its own at a competitive price. Since 1977 turnover has increased five-fold.
Russell Shears was chosen from a shortlist of 46 small firms to take the £10,000 prize as well as getting market and promotional advice from Mobil.
From left to right: Simon Hornby, chairman Design Council, Roy Powell, director, Russell Shears, Nicholas Quick, technical adviser, Brenda Powell, director, Russell Shears, David Trippier, Minister for Small Firms and John Lowein, chairman, Mobil Oil Company.

20–21 January London
10th European Offshore Oil and Gas Pipeline Technology Seminar. *Details:* Mallory Barker, IBC Technical Services Ltd., Bath House (3rd floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: 01-236 4080. Tx; 888870.

26–29 January Amsterdam
Planning and Scheduling of Offshore Projects — a short course. *Details:* The Centre for Professional Advancement, Dept. NR, Palestrinastraat 1, 1071 LC Amsterdam, The Netherlands. Tel: 020/62.30.50.

27 January London
The Last Forty Years of Petroleum Engineering — a dinner meeting. *Details:* G V Lyon, London Section of Society of Petroleum Engineers, Deminex Oil and Gas, Bowater House, 68 Knightsbridge, London SW1X 7LD. Tel: 01 589 7033.

4 February New York
The New York Mercantile Exchange will host the international oil industry at the first annual NYMEX dinner at the Waldorf-Astoria Hotel. *Details:* Jan B. Kay, NYMEX, Four World Trade Center, New York NY 10048. Tel: 212 938-2882.

2–6 February Florida
A symposium on 'Energy from Biomass and Wastes' to be held at the Hotel Royal Plaza in Walt Disney World Village. *Details:* Institute of Gas Technology, 3424 South State Street, Chicago, Illinois, 60616, USA. Tel: 312/567/3881. Tx: 25-6189.

9–12 February The Hague
Corrosion in the Oil and Gas Industry — a short course run by the Centre for Professional Advancement. *Details as above.*

9 February London
'The International Oil Industry and the Environment' — a meeting of the Institution of Mining and Metallurgy. *Details:* IMM, 44, Portland Place, London W1N 4BR. Tel: 01-580 3802. Tx: 261410.

9–12 February The Hague
Structural, Geotechnical and Safety Aspects of Pipeline Design and Construction — a four day intensive course. *Details:* The Center for Professional Advancement, Palestrinastraat 1, 1071 LC Amsterdam, The Netherlands. Tel: 020/62.30.50. Tx: 10662 (cfpa nl).

12–13 February London
Pipeline Management '87 — Conf. and Exhib. It will discuss the latest technology with particular emphasis on digital mapping, pipeline refurbishment, minimum excavation techniques and pipeline inspection, among other subjects. *Details:* Westrade Fairs Ltd, PO Box 53, 28 Church Street, Rickmansworth, Herts WD3 2AG. Tel: (0923) 778311. Tx: 296689.

23–25 February London
Big Bang — The Dust Settles — a conf. *Details:* Online International Ltd, Pinner Green House, Ash Hill Drive, Pinner, Middx HA5 2AE. Tel: 01 868 4466. Tx: 923498.

24–26 February New Orleans
Geosynthetics '87 — a conference. Over 60 technical papers will be presented on new geosynthetic technology. *Details:* Gretchen Artig-Swomley, Industrial Fabrics Association International, 345 Cedar Street, Suite 450, St. Paul, Minnesota 55101, USA. Tel: (612) 222 2508.

February Houston
'Reintegration and Risk: Oil and Gas for the 1990s' — a conf. by Cambridge Energy Research Associates (CERA). *Details:* CERA, 56 John F Kennedy Street, Cambridge, MA 02138, USA. Tel: (617) 497-6446.

2–3 March Dallas
Hydrocarbon Economics and Evaluation Symposium. *Details:* Debbie Whitson, Society for Petroleum Engineers, PO Box 833836, Richardson, Texas 75083-3836. Tel: 214 669 3377. Tx: 730989.

3–4 March London
Seminar on Internal Corrosion Control and Monitoring in the oil, gas and chemical industries. *Details:* Dr CG Googan, Global Corrosion Consultants, Suite 6 Hazledine House, Telford, Shropshire TF3 4JL. Tel: (0952) 502502. Tx: 35438.

8–13 March Vienna
Recent Advances in the Management of Hazardous and Toxic Wastes in the Process Industries — an international congress. *Details:* Secretariat of the RAMHTWPI, 30 Deane Way, Ruislip, Middx HA4 8SX.

9–12 March Bahrain
5th Middle East Oil Show. *Details:* Hugo Johnson, Middle East Oil Show, 11 Manchester Square, London W1M 5AB. Tel: 01-486 1951. Tx: 24591.

17–19 March Aberdeen
Offshore Computers Exhibition & Conference. *Details:* Offshore Conferences & Exhibitions Ltd, Rowe House, 55/59 Fife Road, Kingston upon Thames, Surrey, KT1 1TA. Tel: 01-549 5831. Tx: 928042.

23–24 March London
The 1987 Haztech Symposium — the theme will be Area Classification for Electrical Apparatus in Hazardous Areas. *Details:* Robin Garside, Hexagon Technology Ltd, 2 West End, Weston Turville, Aylesbury, Bucks. Tel: (029) 661 2310.

6–9 April Baltimore
1987 Oil Spill Conference. *Details:* 1987 Oil Spill Conference, Suite 300, 655–15th Street, N.W. Washington DC 20005, USA. Tel: (202) 639–4202.

7–9 April Brighton
International Conference on Fatigue of Welded Constructions. The subjects covered will include, inter alia, design rules, fatigue life prediction, influence of environment, crack detection and minitoring. *Details:* The Welding Institute, Abington Hall, Abington, Cambridge CB1 6AL. Tel: (0223) 891162.

21–23 September London
Seventh International Conference on the Internal and External Protection of Pipes. The organisers say this subject is becoming increasingly important as more hazardous environments are encountered and multi-phase mixtures must be conveyed at higher velocities, densities, pressures or temperatures. *Details:* BHRA, The Fluid Engineering Centre, Cranfield, Bedford MK43 0AJ. Tel: (0234) 750422. Tx: 825059.

6–8 October Aberdeen
Helitech '87 — a conference and exhibition. *Details:* Offshore Conferences and Exhibitions Ltd, Rowe House, 55/59 Fife Road, Kingston upon Thames, Surrey KT1 1TA. Tel: 01 549 5831. Tx: 928042.

Call for Papers

12–14 January 1988 West Germany
Industrial Lubricants — Properties, Application, Disposal. Title and abstract not later than 1 April '87. *Details:* Technische Akademie Esslingen in den Anlagen 5, D-7302 Ostfildern, Federal Republic of Germany. Tel: (0711) 340 080.

7–12 February 1988 Houston
Offshore Mechanics and Arctic Engineering (OMAE). The deadline for abstracts is 20 April 1987. *Details:* Dr Jin S Chung, OMAE Committee, Dept. of Engineering, Colorado School of Mines, Golden CO80401, USA. Tel: (303) 273 3673.

21–23 September London
BHRA's Seventh international conference on the Internal and External Protection of Pipes. *Details:* Conference Organiser, Pipe Protection, BHRA, The Fluid Engineering Centre, Cranfield, Bedford MK43 0AJ. Tel: (0234) 750422. Tx: 825059.

New members elected by Council

Fellow

Williams, Albert EH, Little Pitts, High Street, Westerham, Kent TN16 1RQ.

Members

Atkinson, David D, 32 Russell Road, Moseley, Birmingham B13 8RE.
Blank, Albert, Exxon Co, International, 200 Park Avenue, Florham Park, NJ 07932, USA.
Brown, Jennifer G, Petrofina (UK) Ltd, Petrofina House, 1 Ashley Avenue, Epsom, Surrey KT18 5AD.
Cooper, Michael J, Burman Oil plc, Bowater House, 68–114 Knightsbridge, London SW1X 7LR.
Fairhurst, Christopher P, 'Broadlands', 1 Highfield Road, Mears Ashby, Northampton NN6 0EA.
Gartside, Julie N, Marine Risk Management Ltd, Sherlock House, Manor Road, Wallasey, Merseyside L45 4JB.
Gatward, Colin H, Bayer UK Ltd, Rhein Chemie Division, Bayer House, Strawberry Hill, Newbury, Berkshire RG13 1JA.
Green, David N, 39 Dublin Croft, Great Sutton, South Wirral, Merseyside L66 2TD.
Harris, Malcolm, 'The Grange', Rock Cross, Kidderminster, Worcs DY14 9SF.
Harris, Michael E, Audubon House, Broadgate, Weston Hills, Spalding, Lincs PE12 6DB.
Hennessy, William, Pump Services Ltd, Willbrook Road, Rathfarnham, Dublin 14, Irish Republic.
Hickey, Gary R, 14 Upper Hill Rise, Chorleywood, Herts WD3 2NU.
Howells, Christopher, 34 Milford Road, Haverfordwest, Dyfed, Wales.
Hussain, Mirza A, Oil Desk, BCCE, PO Box 3865, Abu Dhabi, UAE.
Jardine, James R, 12 Cairnlee Avenue East, Cults, Aberdeen, Scotland AB1 9NH.
Kitchen, Simon F, Apartment E1, Charoon Court, Phaholyothin Road, Soi 10, Bangkok 10400, Thailand.
Kite, Robert L, Occidental Petroleum (Caledonia) Ltd, 1 Claymore Drive, Bridge of Don, Aberdeen, Scotland AB2 8GB.
Laird, John C, 'Jondell', 70 Kings Road, Barnetby-le-Wold, South Humberside DN38 6HG.
Michell, Anthony F, Petrolite Ltd, Kirkby Bank Road, Knowsley Industrial Park (North), Liverpool, Merseyside L33 7SY.
Morgan, Ian, 24 Orchard Road, Thornaby-on-Tees, Cleveland TS17 0AW.
Osbond, Roger S, Advanced Management Technologies, PO Box 24, Petersfield, Hants GU32 2ET.
Oshikoya, Olufemi O, 69 Haliday House, Mildmay Street, London N1 4NF.
Parker, John H, 14 Garden Close, Addlestone, Weybridge, Surrey KT15 2PT.
Pearson, Geoffrey J, 39 Downham Drive, Heswall, Wirral, Merseyside L60 5RE.
Randall, Philip A, Arthur Andersen & Co, 1 Surrey Street, London WC2R 2PS.
Rosenberg, Frank B, Crown Central International (UK) Ltd, 6/8 Sackville Street, Piccadilly, London W1X 1DD.
Rudd, Denis T, 'Firs', 4 Wilson Road, Banchory, Kincardineshire, Scotland AB3 3UY.
Taylor, Robert S, 40 Pilgrims Way East, Otford, Kent TN15 6NX.
Tibbetts, Peter JC, 3 Brickhill Cottages, Valley End, Chobham, Surrey GU24 8TF.

Students

Blackwell, Alfred SR, Wahroonga, Cadogan Road, Beacon, Camborne, Cornwall TR14 7RY.
Bowler, Michael M, 21 Hollybush Lane, Hampton, Middlesex TW12 2QR.
Campbell, John R, 1 Regent Court, King Street, Maidenhead, Berkshire SL6 1ED.
Kerlogue, Alison, 59 Ventnor Gardens, Luton, Bedfordshire LU3 3SL.
Md Idris, Nasarudin, Room 6, Lillian Penson Hall, Talbot Square, London W2 1TT.

Deaths

K Barker, Leeds, Yorks; born 1927; elected 1961.
JE Foulger, South Wirral, Merseyside; born 1945; elected 1980.
JS Hubley, Cranleigh, Surrey; born 1917; elected 1966.
R Kirkwood, Ramsey, Isle of Man; born 1919; elected 1973.
J Mason, Church Stretton, Salop; born 1904; elected 1945.
AR McKay, Hull, North Humberside; born 1919; elected 1959.
DRM Pickard, Harrogate, Yorks; born 1904; elected 1933.
RFN Scott, Sunderland, Tyne & Wear; born 1934; elected 1985.
AJ Smith, Aberdeen, Scotland; born 1928; elected 1974.
JM Walker, Dhahran, Saudi Arabia; born 1914; elected 1959.

Around the Branches

Aberdeen

13 Jan: 'Alwyn North Project', by PCK O'Ferrall, Total.
10 Feb: 'A review of the Trends of Illness and Accidents Offshore', by Prof J Nelson Norman.
24 Feb: Annual General Meeting and talk on apprentice training in Shell.

Edinburgh and South-east Scotland

15 Jan: To be announced.
5 Feb: 'The BP SWOPS Vessel', H Rush and P Craig. BP Shipping. 7.30pm.

Essex

14 Jan: 'Transportation of Dangerous Substances — a Police Viewpoint', Sgt Moore, Essex County Constabulary.
18 Feb: 'Lean Burn Engines & Modern Fuel Technology', J Drummond and M Hawkins, Mobil Oil and Ford Motor Co, respectively.

Humber

22 Jan: 'Alaskan Crude Oil Production', speaker TBA.
12 Feb: Annual General Meeting.

Irish

29 Jan: Film Show (Interesting old films from oil company archives) followed by Cheese and Wine reception. *Venue:* Shell House, Hatch Street, Dublin.

London

15 Jan: 'The Shipping Operator's Role in the North Sea', K Borch, Managing Director, The Maersk Company Limited.
18 Feb: 'EFTPOS and the Problems and Benefits for Petroleum Retailers', JW Went, Marketing Manager, Centre-file Limited.

Midlands

21 Jan: 'Coal Resources', P Phillips, NCB. 6.00pm.
25 Feb: 'The Development and Exploitation of Geothermal Energy', Dr RJ Taylor, Energy Technology Support Unit. This meeting will be preceded by the Annual General Meeting of this Branch. 6.30pm.

Northern

20 Jan: 'Factors Influencing the Development of Water-Soluble Metal-Working Fluids', R Brough, Hunting Lubricants & Specialised Products Ltd.
17 Feb: Annual General Meeting followed by 'Fire-resistant Lubricants for Steam Turbines', WD Phillips, Ciba-Geigy Industrial Chemicals.

Shetland

13 Jan: 'New Pelagic Factory', by Dr A Goodland. Venue: Shetland Hotel.
10 Feb: AGM

Southern

Jan 20: AGM and 'Oil Supply, Price and Availability', Pete Ellis, Supply Manager, EPCo. Venue: Esso Chem Training Centre, 1.00pm.
Feb 10: Schools Competition Prize Giving. Venue: Holbury Club, Fawley, 6.30pm.
Feb 26: Inter-Institute Skittles Match. Venue: Bold Forrester, Marchwood, 7.00pm

South Wales

22 Jan: Desulphurisation Processes', a speaker from Bechtel Ltd. *Venue:* BP Chemicals Ltd, Baglan Bay.
19 Feb: AGM and Ladies Evening. To be announced.

Stanlow

22 Jan: AGM & Address by Dr Pierre Jungels, President of the IP. *Venue:* Shell TRC, 4.30pm.
18 Feb: 'Process Heat Integration', Prof Bodo Linnhoff, UMIST. *Venue:* Ladbroke Hotel, 7.30pm.

West of Scotland

22 Jan: 'The Financial Director' by AGC Parker, Finance Director, Shell UK Exploration & Production Ltd.
19 Feb: 'The Project Manager' by HL Ewart, Manager Brae Project, Marathon Oil UK Ltd.

Yorkshire

Jan 13: 'Gas exploration — production North Sea', by D Cole, Senior Project Engineer, Shell UK Exploration and Production.
Feb 10: AGM followed by Hot Pot Supper and Guest Speaker.

The Annual Dinner of the Irish Branch of The Institute of Petroleum

The Principal Guest at the Annual Dinner of the Irish Branch of the Institute of Petroleum, Mr Dick Spring, TD, an Tanaiste and Minister for Energy, said *inter alia:*

'I want to speak briefly about exploration. It is a truism to say that a resource based industry must explore, discover and develop in order to survive in the long-term. Mega-mergers are short term expedients which suit the circumstances of particular companies for a while. "The free market" will create the circumstances for the exploration to happen. This may come in further reduced exploration costs, maybe lower-cost production technology, perhaps more accurate methods of identification and finally supply demand and price developments.

'What is the relevance of this to Ireland now?

'We have a large geographical area. I do not think it can validly be argued that it has been thoroughly explored yet. The exploration which has taken place has not been fruitless. Admittedly we have only one producing discovery, but there have been a succession of shows and flows. Indeed of the 7 wells completed this year, one (50/6–1) flowed good quality oil on test at a rate of 2074b/d and about a million and a quarter standard cubic feet of gas per day — a not insignificant discovery.

'While it is not easy to make a direct comparison between the terms of different countries because of different features which are used, I am satisfied that, following the adjustments which I announced in September, our terms are competitive with those prevailing in Western Europe. I will not bore the experts here with the details but I think these terms strike a good balance between the concerns of the industry and the interests of the State. They meet the industry's requirements in that they are definite and they have a commercial base. I hope the terms will be successful in influencing exploration companies to maintain the impetus of the Irish programme and in particular that as exploration picks up, as I believe it must inevitably, that the Irish territory will attract a reasonable share of the exploration dollars.'

Pictured from left to right: Mr Bill Lynch, Secretary of the Irish Branch of The Institute of Petroleum; the Principal Guest, Mr Dick Spring TD, Deputy Prime Minister and Minister for Energy; and Mr Paddy Maher, Chairman of the Irish Branch of The Institute of Petroleum.

Deliveries into Consumption

UK deliveries into inland consumption of major petroleum products Tonnes

Products	*July 1985*	*July 1986*	*Jan–July †1985*	*Jan–July *1986*	*% change*
Naphtha/LDF	289,360	354,980	1,822,690	2,292,080	+ 25.8
ATF — Kerosine	504,430	550,280	2,823,910	3,085,580	+ 9.3
Motor Spirit	1,850,400	1,927,640	11,647,300	12,270,270	+ 5.3
Burning Oil	76,570	92,070	1,040,080	1,165,540	+ 12.1
Derv Fuel	620,520	673,580	4,089,070	4,509,720	+ 10.3
Gas/Diesel Oil	630,190	547,790	6,238,000	5,703,880	− 8.6
Fuel Oil	580,070	891,790	12,148,920	7,137,690	− 41.2
Lubricating Oil	75,030	74,310	483,490	474,660	− 1.8
Other Products	422,860	523,470	2,964,070	3,259,560	+ 10.0
Total above	5,049,430	5,635,910	43,257,530	39,898,980	− 7.8
Refinery Consumption	418,170	454,980	3,007,870	3,137,420	+ 4.3
Total all products	5,467,600	6,090,890	46,265,400	43,036,400	− 7.0

†Revised *Preliminary

The IP Paul Rumsey Prize

A prize of £250 to commemorate the late Paul Rumsey, former Honorary Editor of the Institute.

Papers are invited on any subject relative to the science, technology, or economics of petroleum and the petroleum industry. The prize will be presented to a person of 30 years of age or under who is judged to be the author of the best Paper submitted. The successful paper will be published in Petroleum Review. The Judges' decision will be final.

The closing date for entries is 30th April 1987.

For further details, please contact Miss Gwen Douglas at The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.